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AMERICAN POTASH INSTITUTE, INC.
INVESTMENT BUILDING **WASHINGTON, D. C.**

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

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Editorial Office: Investment Bldg., Washington, D. C.

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OH,—FOR A BIG RED EAR!

Better Crops with PLANT FOOD

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We're strong, but—

Not Tuff Enuff

Jeff McDermid

URGENT draft of manpower doesn't fret me, but I am worried stiff about this national necessity for getting tough. I do not know anything which has corralled my whole herd of goats so suddenly as the overmastering edict of the times—that tempo of toughness now threatening us like a tidal wave. For years I have known that I wasn't tough enough, but now my sin has caught up with me, and reform is imminent.

It isn't a demand for the ordinary brand of wiry resistance and elastic resilience, such as we maintain every four years in the face of an avalanche of lusty campaign oratory. It is different indeed from the accustomed callousness one acquires while dealing with drouth, taxes, mothers-in-law, bad roads, and dental fillings.

Nay, this national urge for a reversion to caveman dispositions and rowdy attitudes is a sort of psychological new deal, calling for a pattern of life which I am as unprepared to grasp as Mahatma Gandhi is to live with Gargantua, the gorilla.

For it does not merely call for a new deal in my endurance reactions, but it demands that I become ornery and ripsnorting in a positive, personal way. It obliges me to look the world over with a snarl, eschew my patient philosophy, and search the scriptures diligently for longer and louder cuss words.

I have even got to be tough and mean minded right up to the last breath, so that America may be *saved for demonology*. It is up to me to exert myself

just as staunchly and recklessly as that old rock-ribbed hell-bender, Ethan Allen, who came from Vermont granite hills where my forefathers drank rum and rock cider in the Catamount Tavern at Bennington. Up to the last tremor of his valiant life, Ethan was tough and harsh. It was he who replied when a parson stood at his last bedside with assurance that bright angels waited for him. "Waiting are they? Well, Dod gam 'em, let 'em wait!"

BUT somehow something has happened between my good grandfather's America and mine to soften me into a comparative sissy in pinafores. It is the same with most of us, too. Not necessarily a vast difference in physical powers in every case, or even in the average case, or in length of life or resistance to disease—wherein we of this era have advantage over the pioneers. But in the spirit of being willing to subject our bodies to the trials and tribulations, or being able to permit ourselves great privations and discomforts, it is there that we have fallen off the eagle's perch indeed. The question is whether I can ever crawl back again, or convince somebody else's kids that the chief end of life is self-denial, hard times, and bad manners.

Instead of telling them that "Brag is a good dog, but Hold Fast is better," I must advise them to feed both dogs plenty and look for a litter of ugly puppies. Thus all the erstwhile soothing "saws" must be revitalized into cross-cuts and rippers. Pampering is over. Now it is Prepare.

Recently while conjecturing upon this sudden and malevolent change of American outlook, I found a writer who blames the whole mess we are in upon the wimmen folks. Like the original Adam, this scribe claims we are sissies because we are bossed by the gentler sex. He traces it all through as clear as mud and proves that we are soft and cringing and luxurious in habits, simply because our mothers and sisters and wives want security, peace, and provisions. He says that any country where the men folks run things is hard and fibrous, tenacious and tough, and that female Yankee notions have run us too far into air-conditioning and frequent bathing, with not enough concentration camps and lousy shirts.

Of course he forgets that some of the wildest tribes in Africa are headed by females; that a she-bear is a hard customer to meet with her cubs; and that it would take three men and a horse to stand as much pullhauling as a frail mother on a date with the stork.

I am not going to dodge any issues to prove that somebody else besides myself is to blame for my being a lame duck in an alligator pond. Leastways, no alibi exists with me in reference to any of the tender gender, who have done much of the man's work around the shack while I wrote philosophy. I know this much and more too, that if there is any precinct where the wimmen have won out and are wearing the pants, it's going to be mighty good army training for the men to make the gals take them off again. It will "shore" toughen up the boys a heap and give them a real workout before they face the enemy.

PRESUMABLY, if we looked hard for the causes of our present softness, it would like as not be found jointly with ourselves and the inventors. We have catered to the folks who could fashion for us divers devices and dingbats that would make it as easy to stand up as to sit down, and to travel ninety miles an hour on an ox-cart income. Yet I suppose all this poking around to find somebody to crucify as the real original hound who taught us all the easy-going tricks is a lot of waste motion. The point is we have arrived at a spot in the road where a soft tire will be mired, and it takes a bull wheel with iron lugs to hunch us along.

As for me, I am not concerned so much about spotting the chap who misguided us, as about getting wise in a hurry to a short-cut recipe for becoming "dang-blasted onruly" in spite of owning a homeopathic nature that likes to play with kittens.

I am past the time of soldiering (in the army) and not old enough to acquire toughness through the aging process. Yet I stand ready to offer myself to any professional toughener who can take such limp and brittle material as I afford and make a brimstone bad man, such as America thinks she needs.

SECRETLY, I have been trying out all sorts of methods thus far without much success. Instead of buying a magazine which might be taken safely

home, I have spent hours selecting some of those helpful periodicals which for the past few years have been doing their humble best to instil the spirit of Al Capone, Dillinger, and Jack the Ripper into the youthful of both sexes. Arson, mayhem, assault and battery, suicide, homicide, regicide and fungicide, police cars and sirens, treachery and butchery, murder cults and tiger cats—all such have left me shivering but not cold-blooded to the zero point. Probably I should have begun reading them much earlier in my career, especially because they were harder to get in those days and therefore more provocative.

I cannot understand why they say America is not tough enough, when we have access to such able exponents of the life Macaber for one dime a throw. And just to think that the old Polly-Annas and Blue Noses wanted to stop us buying them. "Fifth column" I calls it.

Another time I invested in some gym paraphernalia, including punching bag with a w. k. mug on same, Injun clubs, and sundry. I was supposed to take setting-up exercises, but after one or two fierce rounds with everything I bought, it was impractical for me to set up for awhile. Thereupon I donated the loot to a juvenile club, knowing that their chances for getting tough were better than mine, for the moment.

FEELING that the nuisance forms of door-to-door salesmanship were a great proving ground for mettle, I sent for a batch of soap and mops and began the rounds at a distant spot on half-holidays; but after experiencing bruised toes inserted in slammed doors and Sunday pants chewed by canines, I returned patiently to my role as a perpetual customer. As a consumer I can begin abusing the delivery boy and gradually work up gall enough to roast the storekeeper himself—over the telephone.

Looking backward with regret, I see what awful errors my folks committed in training me to be so kind and generous, warm-hearted, and goofy. Too bad they didn't poke fun at me and belittle me, swipe me hard for my ambitions, and chuck me supperless into the woodshed for my indiscretions. If I had experienced less considerate teachers and friends, had been hardened with infidelity instead of being sent to Bible school, maybe I too could be a superman and join a race of conquerors.

Think of all the wasted hours spent studying botany instead of bombing; of formulas for using nitrogen in plant food instead of explosives; in living on a small income instead of embezzling somebody else's; and in tolerating my neighbors instead of heaving rocks and dead cats through their windows. I can easily perceive that the American way of life has been a path of decadence indeed, and that our precepts were pitfalls.

Instead of being nice about it and murmuring about our lack of intestinal fortitude, let's holler that we haven't got the guts. I am sure that the key to reform is first to indulge in nasty, vehement, and extravagant language mostly

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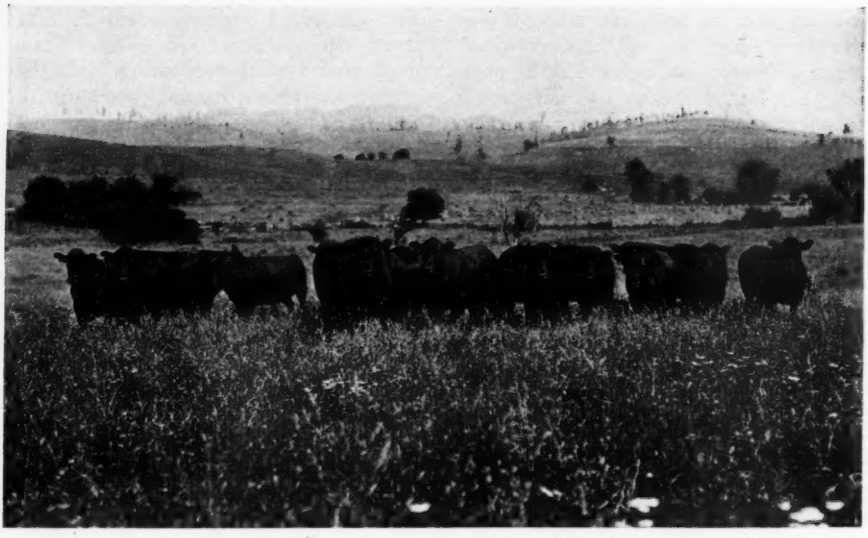

A swing back to grass means diversification with livestock.

Swing Back to Grass

By Earl Wooddell Sheets

Washington, D. C.

Editor's note: This is the first of a series of three articles by Dr. Sheets who was formerly Chief of Animal Husbandry in the U. S. Department of Agriculture, where his constructive thinking and efforts in behalf of pastures are numbered among the many contributions which he has made to the livestock industry and to agriculture.

DURING the seventeenth century the farmers of the British Isles were confronted with agricultural problems, some of which were not unlike those which have confronted us for a long time. Fortunately for them, they became grass conscious and learned the value of grass. Their own John Milton, one of the greatest poets of his time, voiced the universal appreciation of grass in his "Paradise Lost," when he visioned a land without it:

"The bare earth, till then
Desert and bare, unsightly, unadorned,
Brought forth the tender grass, whose verdure clad
Her universal face with pleasant green."

Those of us who began many years ago to help make America grass conscious, to produce more of it, and to give it better care and attention, were merely emphasizing what good stockmen had found out from experience many, many centuries ago. When we urged a more comprehensive program of pasture research and demonstrations, we sought new and fundamental facts and figures to help convince our associates and farmers generally that grass held the secrets for solving many of our agricultural ills.

There were some who knew that pasture was a cheap feed, in fact oftentimes the cheapest. Many knew that there was no other feed to equal it for health and thrift with all kinds of livestock. Long before Thomas Jefferson and other good farmers and stockmen of his time became concerned

about holding the topsoil in place, the more progressive stockmen for many years had recognized the value of certain grasses and legumes for the purpose.

In becoming pasture conscious during the past 20 years, many farmers learned for the first time that when the soil is protected by a covering of grass, erosion goes on ever so much more slowly. They were amazed to learn that land in corn, or cotton, or tobacco for example, erodes more in one year than the same land in a good grass sod would in 500 years, with proper management. Grass has not only become known as nature's most nearly balanced ration for most farm animals, but it has proven to be the most efficient and practical vegetative cover for holding topsoil in place, the use of which is easily within the means of stockmen and farmers everywhere.

Soil erosion is no new phenomenon, neither is man's effort to control it of recent origin. For more than 3,000 years man has been concerned with the forces of nature which have seemed to rob him of his birthright—a chance to make a good living from the land. Of these, wind and running water are those which have given him most concern. Through the ages man has learned that to hold either of them is beyond his power or control. His principal effort has been one of reducing their destructiveness in wearing away the topsoil, by bringing into play such counteracting agencies as will best serve his needs.

Erosion of the more violent types is of course apparent to everyone. All too often man has been inclined to overlook the lesser types by which the processes of erosion go on continuously, unless retarded and held in check by man's efforts.

Running Water Destructive

As one stands beside the great canyons of the west or observes the smaller patterns in the mountainous and hilly sections in most other regions, the destructive force of running water is made apparent. Less striking are the indeterminate millions of gullies to be seen everywhere about us. They take a far greater toll of topsoil than all of the gaping canyons known to man. Running water within the rows of corn, cotton, tobacco, and other clean-cultivated crops in a few years removes

Without grass or some vegetative cover, man's efforts to hold in check the destructive force of wind are futile.

topsoil which took centuries to build.

Likewise, the moving earth as revealed by dust storms, which have plagued the land for many, many centuries, strikes terror into the heart of those who must deal with their destructiveness. The sand dunes of many areas are but grim reminders of their menacing force. Too little concern is given to the never-ending movement of topsoil in other regions and the wearing away of hillside and plateau that goes on continuously unless made more secure by some protective covering.

When the first white settlers came to America they were fascinated by the freshness and greenness of the areas where grass had come in to cover the bare earth after the Indian had cleared away the trees and brush. Only in rare instances, and probably nowhere else except in a few regions in the British Isles and northeastern Europe, had anything like it ever been seen before.

Self-preservation First

First settlers were not much concerned with the problems of erosion. Their first thought was the production of food and self-preservation. The first step was clearing the land, the removal of all vegetation. From early in the morning until late at night the woodsman's axe rang out over the countryside, and the falling timber everywhere gave grim evidence that another home had been built and a farm was being carved out of the wilderness. Size, location, or kind of tree mattered little. The sturdy oak, the lofty poplar, or the shining pine held no sentiment for the early settler, whose only thought was to clear the land that he might grow a crop and thus stave off hunger or possible starvation for his family until the next harvest came. Year after year this land gave him food, even though in diminishing returns. As a result, many of the more progressive among the early settlers who were attached to the old homestead and did not want to move on to a new location heeded the warning and began to put forth some effort to limit the destructive forces of erosion.

Others who were not restrained by sentiment or other ties moved on and began to clear land in new surroundings. The virgin soil gave them new hope for a while, but after the removal of the timber from the steep hillsides, the frequent and ceaseless cultivation of the land soon destroyed the natural balance of nature.

Learned from the Indians

The Indian knew the value of good soil to prevent starvation, as his favorite location was usually a fertile valley near a spring or stream of running water.

How long the Indian had been "deadening" trees by bruising the bark near the base or burning with fire to make clearing less laborious, we do not know. The early settlers found this practice being generally followed, and undoubtedly it had been in use for many generations. Taking lessons from the Indian, the first settlers not only found clearing easier, but they found the deadened trees did not put out leaves to shade the ground or take up the moisture from the crop planted, and they often got a good harvest the first year.

Only in the more thickly settled Indian villages of New England did the early colonists find the Indian making use of muck soil, leaf mold, manure of animals, or other types of fertilizers. Some of these tribes, according to Smith (1620), were known to have practiced the system of putting a herring or two in the hill of corn,—the beginning of our great fertilizer industry in this country.

There is but little doubt that Squanto, the Indian who taught the early settlers how to grow better crops on poor soil and increase the yield on good land by the use of fertilizers, contributed to their well-being and to American agriculture later. The Indian not only taught them the way to endure and guard against hardships

and possible famine, but Kemps, Tassore, and others gave them the secrets of clearing land and of planting, cultivating, harvesting, storing, and using the crops which they found growing here. What the Indian had gained through generations of experience in the New World was passed on to the friendly white settlers, who soon came to realize that their existence was assured when bins and granaries were bulging with golden grain and the products of forest, farm, and garden.

The white settlers learned from the Indian that the clean cultivation of corn gave greater yields. Weeds "smothered" the young plants unless prevented from growing or removed when very small. In quest of an easier way, the settlers began to kill weeds by frequent stirring or cultivation of the soil, thus ushering in the use of implements, oxen, and horses, and later tractors for power cultivation.

The early settlers learned from the Indian to protect their one-crop system of farming from the forces of erosion by following a rotation of fields. From the more progressive New England tribes, they had learned to take certain fields out of cultivation and "rest" them, by allowing them to "grow up"- or putting on a protective covering of grass or other vegetation. They found that larger yields of corn followed this practice, hence the beginning of rotation, not alone of fields but later of crops to accomplish the same objectives.

When permanent pastures are given proper attention, the loss of topsoil through sheet erosion and gullies is greatly reduced.

Had not Captain John Smith and the Jamestown colonists made friends with the Indians, who taught them what they knew about the production and storage of food in the New World, the settlement probably would have perished during the fateful winter of 1609. No doubt these experiences inspired the "work or starve" decree to this and some other settlements which had been established. Many of the early colonies were organized on the basis of each member producing for the common store. Likewise, their subsistence came from the same source. They shared alike regardless of their individual effort or contribution.

Because of the common enemies and hardships in the New World, such planned economy with a mutual system of defense for all may have been justi-

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Potato Growing Trends

By Ford S. Prince

Agronomist, Agricultural Experiment Station, Durham, New Hampshire

FOR the third time in 11 years, J. R. Jackson and Son, Colebrook, New Hampshire, have topped the list in the New Hampshire 300-bushel Potato Club, leading a field of 28 growers in 1939 with a yield of 520 bushels per acre. They also hold the club's State record of 532 bushels per acre, made in 1934.

Other men have made enviable records in this potato "Hall of Fame", but the Jackson story is somewhat more consistent. In the first place this firm has never failed to make the club when they have entered. Second, they have a continuous club membership since 1929 when they first entered the "contest", which means that they have made this club 11 times in a row.

Many other potato growers deserve mention for having made the desired yield several times, including Burton A. Corbett of Colebrook with 10 appearances, H. E. Webster of Franklin, J. S. Dearborn of Suncook, and W. G. White of North Haverhill each having an 8-year record with more than a 300-bushel yield, while there are many other growers with four, five, six, and seven appearances. Space will not permit mentioning the names of all these good growers whose names will go down in New Hampshire farming history. What we are mainly interested in here is to enumerate the facts gleaned from the club members through the years and possibly to answer the inquiry as to why our potato growers put their O. K. on the club year after year in fairly large numbers.

Gets Farm-sized Facts

Since the answer to the latter inquiry is shorter, we will proceed with that first. The club was started by the New Hampshire Extension Service as an honor club for men who produced good yields of potatoes, as well as to permit county agents and extension specialists to follow the methods our growers practiced in producing these yields. That the club must be serving a useful purpose is attested to by the fact that at recent meetings of potato growers in several New Hampshire counties where the question was asked, "Should the

John Jackson (right) and son, winners in the New Hampshire 300-bushel Potato Club. This field made 520 bushels per acre in 1939. Plenty of plant food and good practices have been responsible for the Jacksons' winning first place in the Club 3 different years.

300-bushel club be continued?" the answer has been a very decided "Yes."

A grower at one of these meetings in discussing this question said, "The club picks out a lot of facts on a farm-sized scale that we wouldn't get in any other way." His cryptic answer probably holds for many growers who have expressed themselves merely by joining the ranks of the club rather than by talking about its virtues.

From the extension angle we have tried to build the club into a clearing house of information for our potato growers. Members, farms, and fields are used as demonstration and as stops on tours where potato growing operations are demonstrated and discussed. At digging time a record of the significant features of each grower's methods is taken, after which the records are summarized and sent out to the members, so that each one will be informed as to how his methods have differed from those of other growers.

Keep Yearly Records

Distribution of the summary sheets is not limited to those who make the club, but may be secured by anyone who is interested in the potato crop. By having these records, the Extension Service is in possession of the facts as to how growers' practices change year by year with respect to any of the important processes of potato growing.

Perhaps it would be well to say something further about yields. The average yield produced by the members that made the club in 1939 was 377 bushels per acre. Two yields ran above 500 bushels, eight were between 400 and 500 bushels, while the remaining eighteen were between 300 and 400 bushels per acre. Yields are checked by digging rows at random on a 3-acre tract. While a grower is permitted to select his best 3-acre piece for checking, this is not always done, for the simple reason that he cannot always be certain where his potatoes are going to yield the best until after his potatoes are harvested.

There is relatively no padding practiced to influence yields, and in 1939 there was not a single instance where a grower dumped on a lot of extra fertilizer or performed some other practice to boost his yields beyond that of his whole acreage. This may be one reason why yields in this club have not run as high as some of the one-acre contests in other States.

What do these records show as to the consummation of good potato practices, and what changes are methods undergoing? First, and probably the most significant trend, the strictly commercial grower has enlarged his acreage so that he can use power machinery and more particularly so that he can practice a shorter rotation. The old rotation consisted of 1 year in potatoes followed by 6 or 8 years in hay. This rotation often led to disastrous attacks of wire worms, due to the long period in sod crop. Now it is almost common practice to keep the land in potatoes 2 or 3 years, then follow with a green manure crop or seed to oats and clover, which in turn will occupy the land not more than 2 years. Thus the old New England rotation has gone "by the boards," so far as these potato growers are concerned.

Varieties and Stand

Varieties other than the Green Mountain are creeping into our 300-bushel story. Formerly nothing but Mountains were entered, but in 1939, three men grew Chippewas, one Katahdins, while one other had both Chippewas and Mountains. While this does show a slight trend away from Green Mountain at the moment, how far it will go is as yet unpredictable.

The Green Mountain variety is pretty well established because of its yielding ability and high cooking quality, and other varieties will have to measure up to or above these high standards to supplant it. Such a variety is not yet in sight.

The amount of seed used on each acre has increased from 16 to nearly 20 bushels per acre. There is a ten-

dency for certified seed growers to use more than 20 bushels per acre, since they plant closer in an attempt to get a more desirable size in their seed stock.

When checking the fields in 1939 for the first time, we kept a fairly careful record of the stand of potatoes our growers had secured. Due to one cause or another, we found a great many skips in most fields and discovered that although growers usually set their planters so that they will have one hill to each 11 inches of row or less, that actually at digging time there was only one hill to each 15 inches of row. In other words, on the average, hills at digging were 4 inches farther apart than they should have been had each seed piece germinated and grown.

It is quite obvious that some soils might support closer stands of potatoes than others, and that what might be a good stand on one soil type might be too heavy a stand for another, even if the plants were evenly spaced in the row.

The fact remains that stands where the plants average 18 inches apart are too thin for almost any soil in our New England climate, and as several of these good growers had such stands, we feel that this is one of the limiting factors to potato yields, and that something should be done to remedy it. An analysis of the situation indicates that picker planters coupled with faulty seed cutting may be the cause of part of the trouble. Often mechanical seed cutters are used, and unless the knives of this machine are properly adjusted, too many slivers of potatoes, many without eyes, are produced. Since the picker planter cannot be held responsible for dropping a seed piece without eyes, this trouble must be eliminated before the seed potatoes go into the hopper of the planter.

Often a grower can adjust the knives of his mechanical cutter to do a better job. Failing in this, he can resort to hand cutting, a method which many men feel is the only way to prepare seed potatoes for planting. Adjusting the planter, especially the picker type, for closer spacing is also a method that can be used to get more satisfactory stands.

The importance of stand as influencing yields is shown by our records in 1939. Growers whose plants averaged 15 inches or less in the row had yields of 413 bushels per acre, while those whose potatoes were spaced more than 15 inches secured but 347 bushels. Stand thus appears to be a rather vital factor both to yields and profits, since with a good stand, fertilizer, spray material, and labor involved in cultural operations are not wasted.

These rounded hilltops in the mountains of northern New Hampshire are excellent for high potato yields and for the production of certified seed.

Two trends are evident with respect to fertilizers, the use of more plant food per acre year by year and the drift toward higher analysis materials. There has been a steady increase in

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Trees and the Soil

By E. R. Jackman

Farm Crops Specialist, Oregon State College, Corvallis, Oregon

Courtesy, S.C.S., U.S.D.A., Wash., D. C.

Looking up a 30% slope in a prune orchard located 5 miles west of Newberg, Oregon. Incipient gullying on Red Hills soil shows the need for cover crops.

MOST of the good soils of the world were either built up under a cover of trees or were deposited by wind or water. In the southern States they refer to their "hundred-year rotation"; cotton and corn for about 20 years, followed by brush and trees for 80. The theory is that a long period of trees and brush will build enough fertility to provide profitable crops for a few years.

Knowing that forest trees were good for the land, the early planters of orchards paid little attention to orchard soils, but recent years have changed all that. The eastern orchardist has discovered that he can beat the western grower at his own game, provided a quality product is produced, and fertility is one of the secrets. The western grower with irrigation is finding that when he sells 10 to 20 tons of fruit year after year, he is also selling fertility. And the western dry-land grower is discovering to his dismay that every drop of muddy water that runs from his orchard during the winter is carrying away part of his precious top-soil. All of these add up to nation-wide activity in orchard soil building.

Along the Atlantic Coast and in the Midwest, a favorite orchard management system is to seed blue grass or orchard grass and leave it there. This prevents erosion, catches the leaves in the fall, controls weeds, and is altogether satisfactory at first. But in time the available nitrogen runs short, and the quick-starting grass becomes a nitrogen grabber at the expense of the trees. This system of permanent sod works much better if the grass is not pastured or cut for hay. If an attempt is made to use the grass, then the soil is doing double duty, furnishing two crops instead of one—and it tires more rapidly. It may be fine for the livestock, but it doesn't put fruit into the box.

So those who keep the sod covers are turning more and more to commercial fertilizers. That seems to work fairly well, provided the grass crop is left on the land unpastured. There is a fire hazard with dead grass in an orchard, and mice and insects in the fall call gleefully, "Look what we've found."

The owners of western irrigated orchards are turning mostly to alfalfa and sweet clover. Here again a fine 4-ton crop of alfalfa is a temptation to a man armed with a mowing machine, but the good operators are letting the long view triumph over the immediate profit. And there is danger connected with using this hay, if it has been sprayed heavily with lead arsenate.

Another and more sinister soil prob-

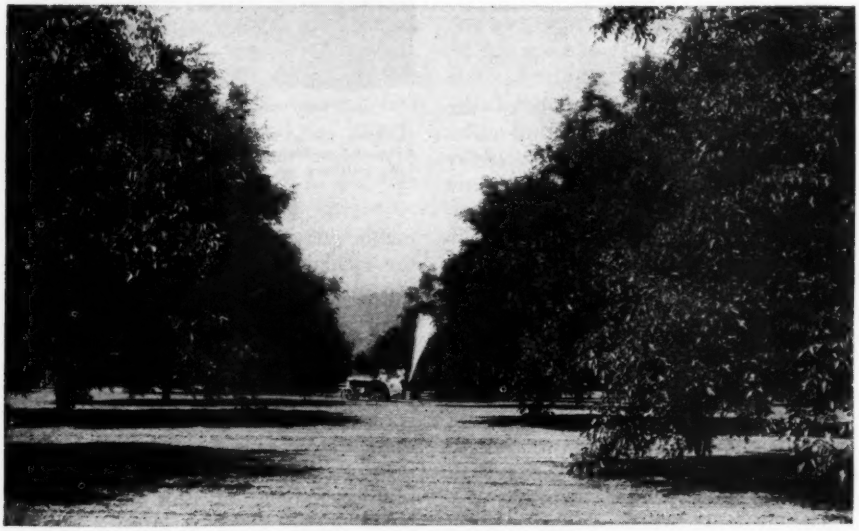
lem is the serpent in the orchardist's Paradise right now. In some of the older orchard sections where codling moth spray programs have been followed relentlessly for years, the soils are beginning to show the effect of the tons of lead and arsenic. It is becoming more and more difficult to get alfalfa to grow. The hope here lies in finding some other treatment for the ubiquitous moth. Rats are now poisoned with substances harmless to humans, so there must be something somewhere that will be death to a worm but harmless to soil.

a cover crop and a fruit crop, then clean tillage part of the year, at least, is necessary.

Growers are checking the erosion by:

1. Contour planting of new orchards. This has been practiced for generations in vineyards and orchards of Europe, but is fairly new here.

2. Use of straw, manure, or hay mulches. Many are surprised to learn that, judging by values of commercial fertilizer, alfalfa is worth $8 per ton to plow under. This does not include its value in preventing erosion and adding



Spraying operations in a clean cultivated walnut orchard in western Oregon.

Erosion is the chief enemy of the western dry-land orchardist, and it has taken plenty of toll in other parts of the nation. Many growers, by ignoring it, have literally sold their farms down the river. Clean tillage in an orchard is exactly like summer fallow in a grain field; it kills weeds, preserves moisture, and makes plant food available, but it surely destroys organic matter, and thereby puts the soil in condition to erode. It is a cumulative process that starts slowly but gathers speed as the years pass, and by the time the grower has noticed the effects, the field may be damaged beyond repair. But if soil is thin, or rain inadequate to grow both

to the organic matter. Many tons are bought and plowed down in western orchards every year. A simple trial will convince anyone that even a very thin layer of straw on the surface will slow or stop erosion. Orchardists with access to straw or hay are using it.

3. Terraces or contour ditches to lead the water off or spread it.

4. Cultivation on the contour.

5. Winter cover crops. In most of the western orchard-growing States the winter is the rainy season, and if erosion can be prevented then, there is not likely to be any in the summer. Vetch is largely used. Austrian winter peas

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Using Soil Tests For Canning Crops

By W. T. Ewen

Ontario Agricultural College, Guelph, Ontario, Canada

DURING the past 2 years an intensive study has been made in Essex County and adjoining areas of Kent County, Ontario, with regard to calibration of rapid chemical soil tests for canning crops, with particular attention paid to tomatoes.

This area is characterized by its absence of hills, being for the most part flat or slightly rolling in topography. The various soil types of Essex might be listed as follows:

Brookston clays—280,000 acres, other clay types—60,000 acres, loams—35,000 acres, sandy soils—56,000 acres, and all other types including mucks, bottom lands, etc.—19,000 acres. Most of these soils are low in phosphates, with a considerable degree of variation in organic matter and potash content.

The climate of this area is the mildest in the Province, with a mean annual temperature of 48 degrees Fahrenheit, and an average of 160 frost-free days in the growing season. Outside of the truck garden and orchard crops area, the chief cash crops are tobacco, tomatoes, and sugar beets, all of which require high levels of plant nutrients.

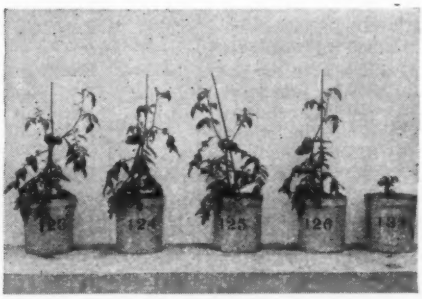

Fig. 1—Pot cultures showing plants growing in Tuscola sandy loam. Numbers 123 through 126 received varying amounts of phosphorus and potash; 132 is the check.

During 1939 an intensive soil testing and fertility plot programme was instituted on the main soil types in this locality. At the same time fertilizer plot studies in other parts of the Province have been followed closely in keeping with the work of calibration of rapid chemical soil tests.

Preliminary work carried on in 1937 and 1938 indicated that none of the rapid soil tests for phosphorus adequately portrayed the amounts of available phosphates in our soils. Hence the first task was to develop a test which would be suitable for this purpose.[1] On the other hand, the potash and pH tests of Thornton et al.[2] have given good results. Spurway's[3] tests for calcium and magnesium have given satisfactory results. Although Spurway's nitrate test was used to some extent, the author believes that the test for "active" organic matter of Thomas and Williams[4] is of more value in estimating a soil's ability to produce nitrate nitrogen, under normal conditions.

During the winter of 1938-39 Neubauer analyses and pot culture experiments were conducted with several soils from this area. Two of the soils used for pot culture studies are described here. One of these soils, a Tuscola fine sandy loam, gave the following tests: pH—6.4; Ca—1,200; Mg—56; NO_3—200; P_2O_5—40; and K_2O—20 pounds per acre 6 inches; organic matter—4.0%. The tomato plants in the check pots showed phosphate deficiency within 2 weeks after planting. Photograph 1 shows the plants 7 weeks after plant-

TABLE I

	Lb. per Acre						% O. M.
	pH	Ca	Mg	NO_3	P_2O_5	K_2O	
1. Perth clay loam.....a	6.8	1,000	56	56	40	400	3.8
Perth clay loam.....b	7.0	1,500	56	40	30	320	.....
2. Brookston clay.....a	6.4	800	56	16	13	160	3.5
Sand spot phase.....b	6.6	1,000	56	8	13	80	.....
3. Brookston clay.....a	6.8	1,100	56	16	30	160	3.6
Brookston loam.....b	7.0	1,000	56	16	40	80	.....
4. Brookston clay loam.....a	6.4	800	56	16	13	160	3.6
Brookston clay loam.....b	6.6	800	56	16	13	80	.....
5. Brookston clay loam.....a	6.6	1,000	56	32	13	120	3.9
Brookston clay loam.....b	6.9	900	56	8	13	120	.....
6. Brookston clay loam.....a	6.4	1,100	56	16	40	400	4.9
Brookston clay loam.....b	6.6	900	56	8	40	500	.....
7. Brookston clay.....a	6.4	800	56	16	40	120	5.1
Brookston clay.....b	6.6	1,000	56	8	30	200	.....
8. Brookston clay.....a	6.6	1,000	56	16	30	200	3.4
Brookston clay.....b	6.7	1,100	56	8	40	200	.....
9. Brookston clay.....a	6.0	900	56	8	30	400	4.0
Brookston clay.....b	6.4	1,100	56	0	40	200	.....
10. Brookston clay.....a	6.4	1,400	56	160	60	200	7.8
Toledo influence.....b	6.6	1,000	56	40	110	320	.....
11. Brookston clay.....a	6.4	1,200	56	40	110	450	3.7
Brookston clay.....b	6.6	1,200	56	24	120	450	.....
12. Tuscola fine.....a	6.4	1,200–	56	200	40	20	4.0
Sandy loam.....b	6.3	1,000	56	80	100	20	.....

a—Surface soil.
b—Subsoil.

TABLE II

Soil Type	Analysis	Rate and Method of Application	Yield (Bu.)	Quality
1. Perth clay loam.....	2–16–6	500 lb. broadcast*	320	Excellent
2. Brookston clay, sand spot....	2–12–10	500 lb. broadcast	213†	Excellent
3. Brookston clay loam.....	2-12–6	500 lb. broadcast	262	Fair
4. Brookston clay loam.....	2–12–6	450 lb. broadcast +manure	263	Excellent
5. Brookston clay loam.....	2–12–10	350 lb. broadcast	294	Excellent
6. Brookston clay loam.....	2–12–6	500 lb. broadcast	318	Excellent
7. Brookston clay.....	2–12–10	250 lb. broadcast 250 lb. in the row	355	Excellent
8. Brookston clay.....	2–16–6	250 lb. broadcast 250 lb. in the row	313	Excellent
9. Brookston clay.....	2–12–6	325 lb. in the row	315	Excellent
10. Brookston clay.....	2–12–10	375 lb. broadcast 375 lb. in the row	385	Excellent
11. Brookston clay.....	2–12–6	500 lb. in the row	541	Excellent
12. Tuscola fine sandy loam (3 plots)	(a) 2–16–10	700 lb. in the row	198‡	Excellent
	(b) 0–20–20	700 lb. in the row	195‡	Excellent
	(c) 2–16–6	700 lb. in the row	123‡	Good

* Broadcast with a grain drill.
† Below county average (240 bu. per acre).
‡ Marketable fruits; disease infestation very severe in this field.

ing. Potash deficiency began to appear in the leaves and fruits with the ripening of the first truss in the low potash pots.

A Brookston clay gave tests of pH—6.6; Ca—1,200; Mg—56; NO_3—40; P_2O_5—80; K_2O—450 pounds; organic matter—7.2%. This soil had sufficient phosphate to bring two trusses of fruit to maturity, but starvation symptoms began to appear when the third truss began to ripen. On the other hand, no

Fig. 2—Field of tomatoes growing on fine sand. Note heavy, luxuriant growth, July 21, 1939.

nitrogen or potash symptoms appeared at any time during the experiment.

With these results in mind, a more extensive and at the same time a more intensive study of these soils was undertaken this past year. Representative soil samples were taken from three farms for special fertilizer plot studies and from four farms from each district within the field of investigation. Each of these fields was quite representative of the respective types of soil within a district. The soil samples were tested for pH, calcium, magnesium, nitrates, phosphate, potash, and active organic matter. The fertilizers used on the various test fields were based on the rapid soil tests.

At regular intervals soil and plant samples were taken. Soil analyses were made by the above-mentioned tests, and nitrates, phosphate, and potash tests of the plant samples by the Thornton method. In Table I the rapid tests data of some of these soils are presented.

In Table II are presented the rates

Fig. 3—Section of the same field shown in Fig. 2 on Sept. 4, 1939. Note ravages caused by disease infestation.

per acre of the fertilizers used, the yield and quality of the fruits in bushels per acre (60 lb.) of the soils shown in Table I.

It may be pointed out at this time that tomatoes growing on sandy soils, with high amounts of organic matter, produce much softer, ranker, more rapid growth than tomatoes grown on the heavier types of soil. Leaf spot and spot rot of the fruits were very severe on these areas in 1937, 1938, and 1939. Photograph 2 shows a field of tomatoes on July 21. This field is a Tuscola fine sand which gave the following tests: pH—6.4; Ca—1,200; Mg—56; P_2O_5—40; and K_2O—20 pounds per acre 6 inches; active organic matter 4.0%. A 750-pound application of 0-10-20 per acre was applied in the row at planting time. Photograph 3 shows the same field on September 4. Because of this persistent tendency towards disease infestation, the author advised that late tomatoes be planted on the heavier soils in Essex County.

In practically every case, the soil tests have accurately indicated the level of fertility of these soils as demonstrated by crop yields. For example, the spring tests on a Brookston clay showed pH—6.4; Ca—1,200; Mg—56; P_2O_5—110; K_2O—450 pounds per acre; active organic matter—3.7%. This soil, without fertilizer, produced more than 8 tons of quality tomatoes per acre—more tomatoes per acre than the county average. With 500 pounds of 2-12-10 per acre in

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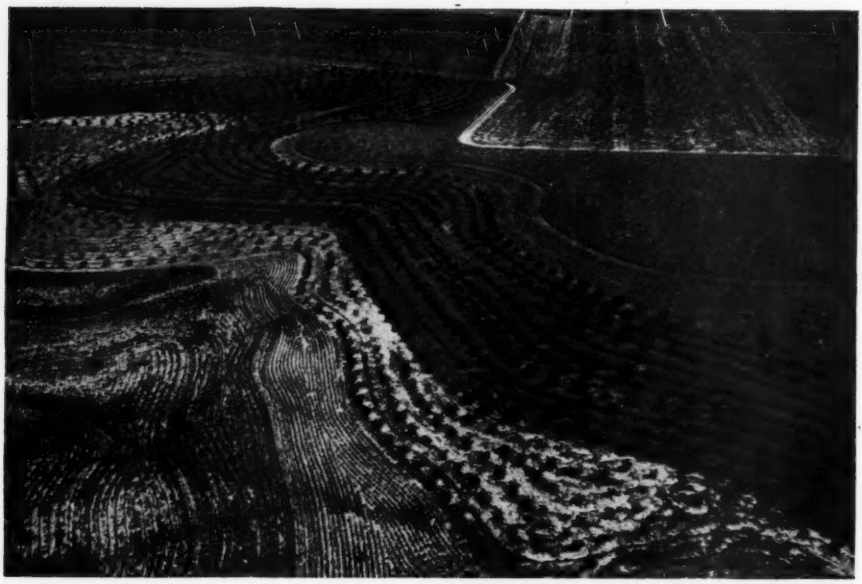

Master Farmer Holmes contours his peach orchards. With good land, use of legumes, and liberal use of fertilizer, his yields are high.

Master Farmers Strong On Soils & Livestock

By A. B. Bryan

Agricultural Editor, Clemson College, Clemson, South Carolina

THE seven South Carolina Master Farmers, recently selected and honored by the South Carolina Extension Service and *The Progressive Farmer* magazine, are all strongly soil-building-conscious and livestock-minded. They have as important planks in their platforms of successful farming (1) soil conservation for more profitable crop yields, and (2) livestock production as a source of income to balance and improve crop production.

Without exception the seven who won their "Master's" degree in practical agriculture are soil savers and soil builders, protecting their soils from the ravages of erosion and building them up through rotations and use of legumes and other cover crops, thus making their land more responsive to the use of commercial fertilizers. High yields per acre and higher profits from every dollar spent for fertilizer are the natural results.

Without exception also the seven derive a considerable part of their cash income from livestock — hogs, dairy cows, beef cattle, and poultry. Naturally these Master Farmers find that balanced crop rotation and soil improvement are greatly aided by the presence of livestock to consume grains, legumes, and by-product feeds produced in diversified cropping, and to

make soils more fertile with compost from the livestock.

And thus we have soil conservation and livestock production hand in hand to make soils more productive, to make the use of commercial fertilizer more efficient, to increase the per acre yields of crops, to give higher net returns or profits, as well as to provide additional cash profits from the sale of livestock.

With experience built on these practices, Master Farmers, we find, are liberal users of commercial fertilizers, for they have learned how to make every fertilizer dollar produce many dollars in net profit. Let's examine briefly the soil-building practices of four of these leaders in better farming. They are typical of all.

A first secret of the success of Master Farmer Marvin Adams of Marlboro County was his realization from the first that only good land will bring good returns and permanent success. Intelligent practices in soil improvement include summer and winter legumes, wise rotations, turning under all crop residues, conserving manure from livestock, and liberal but judicious use of fertilizer.

The Adams soil-improvement keynote may be sounded briefly by saying that no fields are left bare in winter. He has around 800 acres in winter cover crops, and summer legumes of course go in all of his 200 acres of corn.

From the excellent crop yields secured by Master Farmer Tom L. Ross of Darlington County, it is clear that he is no soil robber, but rather a soil builder, who knows how to make his acres more productive year by year. To this end more than one-fourth of his cultivated land is always planted to legumes. All corn is interplanted with cowpeas, soybeans, and velvet beans. Small grain is followed by legumes, the small grains themselves serving as winter cover crops which retard erosion in winter. Thus we have a 3-year rotation of cotton, corn, and small grains, with legumes in corn and after small grains. Stable manure and crop residues are carefully returned to the soil to increase plant food and improve soil texture.

When Dewey Butler, Greenville County Master Farmer began operations on his 50-acre farm, he found gullies and washed-up, run-down soil

The Holmes residence is typical of the best southern plantation homes.

that needed rebuilding before it would yield abundantly. With soil saving and soil building the first big objectives, Dewey first terraced the cropland to protect it. Then he went in strong for legumes to enrich it, for rotations to keep it fit for successful crop production, and for judicious use of fertilizer to increase yields. A 3-year rotation he has found advantageous consists of (1) grain followed by legumes, (2) cotton with a winter cover crop, (3) corn interplanted with legumes.

All tilled land on the 1,700-acre farm of Master Farmer L. D. Holmes of Edgefield County has been terraced under an agreement with the Soil Conservation Service. Even mature peach orchards were slashed where necessary to terrace the land. Orchards are planted to rye in winter and to peas, crotalaria, and beans in summer. Most of the cultivated land is planted to legumes each year, and the soil is consequently in a high state of productivity. Fertilizers are mixed to meet plant-food requirements as experience points the way.

Let's look now at the livestock practices and experiences of the Masters as a proper and profitable balance to crop production. When Thomas Clyde Moss, Calhoun County Master Farmer, sent $425 to Plattsburg, Missouri, for a purebred Poland China sow 25 years ago, he started a farming venture that not only proved successful for himself, but has been a fine service to South Carolina and the South, in supplying a real need for more and better hogs. Moss's natural fondness for animals made it easy to turn to purebred livestock along with the time-honored cotton farming of his section.

In his Poland China breeding herd he now keeps 18 to 20 brood sows, from which he sells pedigreed breeding stock far and wide. But he also sells market hogs, for which the packers give him a premium of 25 to 40 points for high quality. In time Tom Moss became interested in beef cattle and now has a herd of 40 Herefords, headed by a registered sire with a goodly number of purebred females.

"For profitable livestock farming you

Master Farmer Meares grows 1,500 lb. of tobacco per acre with a liberal fertilizer program: 600 lb. of superphosphate, 300 lb. of cottonseed meal, 700 lb. of sulphate of potash magnesia, 50 lb. of muriate of potash, and 100 lb. of nitrate of soda per acre.

must grow ample feeds, and on the other hand, the only way to make a profit on the feeds produced in crop diversification is to feed them to your own livestock," says Moss. Hence the large acreage of corn, small grains, legumes, and permanent pastures.

The crops farming of Marvin Adams is supplemented with livestock, particularly hogs and beef cattle, to consume much otherwise unmarketable feeds and crop byproducts. About 50 head of hogs are fed out twice yearly and sold through the cooperative association. In

Master Farmer Moss chatting with his son and daughter on the front steps of their home.

L. D. Holmes has some 300 acres of bottoms pasture land and grows much small grain and other feed crops in his farming layout. To utilize these are not merely the farm work stock, family dairy cows, and some hogs, but also and particularly a tiptop beef cattle herd of 75 to 150 Herefords.

"The fact that I can graze cattle 12 months in the year is the basis of my success with beef cattle," says Mr. Holmes. And here briefly is the grazing scheme: On 150 acres of good bottoms pasture from spring to October; then on corn and velvet beans fields until Christmas; then on rye fields until pasture is ready in the spring. In his bottoms pastures he is strong for a good combination of lespedeza, Bermuda, Dallis, and carpet grass, which gets plant food in a fertilizer formula of 13-4-8 and lime.

a recent sale of 54 hogs, all graded tops, indicating the skillful feeding. Similarly, a regular herd of about 50 beef cattle is being maintained. Permanent pastures, 200 acres of cowpeas for hay, plus the grain crops, make a firm foundation for a larger livestock structure now being built up.

An important source of cash as well as of food for the family in the farming scheme of Tom L. Ross, Darlington County Master Farmer, is hogs. So important that Ross says: "Hog money is good money in my farming; I hardly know what I would have done without it in some of the hardest years."

With 10 Poland China brood sows as a basis, Ross raises around 80 pigs per year, and buys feeder pigs and feeds out 200 per year. For feed there

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Building Better Soils

By A. W. Blair

Agricultural Experiment Station, New Brunswick, New Jersey

IN a letter to Arthur Young of England, under date of December 12, 1793, George Washington describes his farm land as follows:[1]

"No estate in United America is more pleasantly situated than this. It lies in a high, dry, and healthy country, 300 miles by water from the sea, and, as you will see by the plan, on one of the finest rivers in the world. Its margin is washed by more than 10 miles of tide-water; from the beds of which, and the innumerable coves, inlets, and small marshes, with which it abounds, an inexhaustible fund of rich mud may be drawn, as a manure, either to be used separately, or in a compost, according to the judgment of the farmer.

"The soil of the tract, of which I am speaking, is a good loam, more inclined however to clay than sand. From use, and I might add, abuse, it is become more and more consolidated, and of course heavier to work. The greater part is a grayish clay; some part is a dark mould; a very little is inclined to sand; and scarcely any to stone. A husbandman's wish would not lay the farms more level than they are; and yet some of the fields, but in no great degree, are washed into gullies, from which all of them have not as yet been recovered."

In this description there are three stated or implied conditions, namely:

1. That his farm was originally good land.

2. That it had been, to a certain extent, abused and therefore depleted of some of its natural fertility.

3. That it was possible to rebuild this depleted land.

[1] Brooke Walter Edwin, The Agricultural Papers of George Washington, pp. 82-83. The Gorham Press, Boston, Massachusetts, 1919.

Washington knew the curse which rests on a country whose land is allowed to wash into gullies. Likewise he knew that with such washing the cream of his land was taken away. This is clearly shown by directions which he gave to his manager, James Anderson in 1800, as follows:[2]

"The season is now far too advanced, and too cold, to be engaged in a work that will expose the hands to wet; but it is of such essential importance, that it should be set about seriously and with spirit next year, for the summer's sun and winter's frost to prepare it for the corn and other crops of 1801. All the hands of the farm, not indispensably engaged in the crops, should, so soon as corn-planting is completed in the Spring, be uninterruptedly employed in raising mud from the *pocosons* (swamp or marshy place), and from the bed of the creek, into the scow; and the carts so soon as the manure for the corn and potatoes in 1800 is carried out, are to be incessantly drawing it to the compost heaps in the fields, which are to be manured by it. What number of hands can be set apart for this all-important work, remains to be considered and decided upon."

Restoring Lost Fertility

In the absence of commercial fertilizers for improving his soil, Washington did the next best thing, namely, he returned to his land as much of this lost fertility as was possible. He recognized in this mud in compost form, an inexhaustible fund of natural fertility that came from the land, and he had the vision to see that by returning it, he could build up the waste places.

[2] Loc. cit. p. 112.

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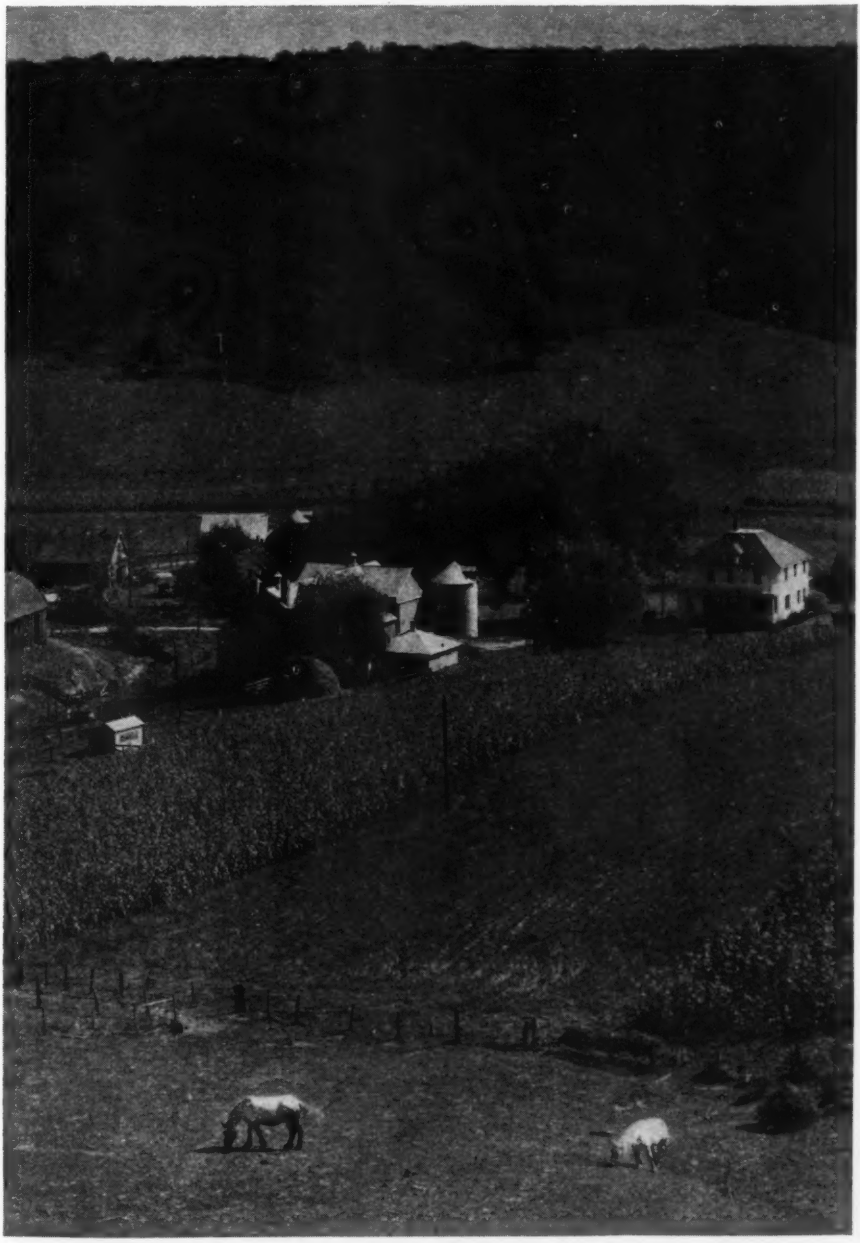
PICTORIAL



THIS FARMSTEAD SETTLED SNUGLY IN A VALLEY NEAR LA CROSSE, WISCONSIN, SUGGESTS THE PEACE AND PLENTY OF WELL-MANAGED AMERICAN FARMS.

Above: Corn being "made ready" for the silo, a sturdy bulwark against winter's needs.

Left: Modern equipment has eliminated the olden harvest festivities connected with hop picking.

Right: Grapes in luscious clusters have always been the symbol of harvest and plenty.

Below: An aerial view of last year's National Corn-husking Contest at Lawrence, Kansas.

Above: Sleek mares and colts raised on the W. J. Taley Farm in Maury County, Tennessee.

Below: 170,000 pounds of next year's lawn grass seed drying near Creston, Iowa.

The Editors Talk

Fertilizer Sales Show Progressive Trends

So informative is a recent press release of the U. S. Department of Agriculture entitled "Report on 1939 Fertilizer Sales Shows Trend Toward Fewer Grades" that we are prompted to print it herewith in full. Not only does the report give tonnages for the country as a whole, but tonnages for States leading in fertilizer usage, as well as details on the kinds and grades in favor. This information comprises the most recent and accurate picture of fertilizer consumption in the United States and therefore is of value in showing how far growers have gone toward restoring and improving the fertility of American soils.

"Fewer grades of fertilizers, and larger tonnage of mixtures containing high proportions of plant foods are progressive tendencies evident in the results of a survey and analysis of fertilizer sales in 1939. Both these trends have been recommended by State and Federal experimenters as desirable, and of advantage both to farmers and to manufacturers. The U. S. Department of Agriculture investigators, A. L. Mehring and Lola S. Deming had the cooperation of Herbert Willett of the National Fertilizer Association in assembling the figures, which are more nearly complete than those in any previous report of this kind. Their analysis of the results has just been published by the association as a special bulletin.

"Fertilizer sales for 1939 amounted to 7,616,000 tons. The survey gives details of the kinds and grades of more than 90 percent of this, or 6,905,984 tons. The most comprehensive previous survey, for 1934, covered only about 78 percent of sales for that year. State records were used wherever reliable reports were available and were reorganized for uniform presentation and tabulation. Half the states now have records of fertilizer sales suitable for such a study as compared with only 15 states in 1934. Where official records were not available, questionnaires were sent to all dealers handling fertilizers.

"Nearly a thousand grades (982) were reported, and the mixtures in the remaining 10 percent would bring the total grades to more than a thousand. This compares, however, the investigators point out, with 1,291 grades in the 78 percent of the fertilizers reported on in 1934.

"Gains in the content of plant food in fertilizer mixtures for 1939 are reflected in the tabulation of the weighted average. This records substantially what would have resulted if all the mixed fertilizers had been mixed together in one uniform mixture. Expressing the plant food units in decimals instead of in the whole numbers usual in fertilizer grades, for 1939 the average grade designation would

be 3.76-9.08-5.78 compared with 3.52-8.73-5.12 for 1934, showing increases in each of the main plant foods, nitrogen, phosphoric oxide, and potash.

"Ten states bought more than a quarter million tons each of fertilizer in 1939, with North Carolina well in the lead with more than a million tons (1,107,347). Four other Southern States exceeded a half million—Georgia, 736,179 tons, South Carolina 672,753, Florida 556,782, and Alabama 531,000. Virginia used 418,973 tons followed by Pennsylvania, 356,853, Ohio 345,585, and New York 323,980, with Mississippi tenth with a consumption of 285,667 tons.

"Florida reported sales of more grades than any other state—at least 360, and South Carolina and Puerto Rico also reported great variety in mixtures. This year, however, Puerto Rico will choose from not more than 54 grades eligible to registration under new regulations. Of the states using large supplies of fertilizers, Alabama and Mississippi reported fewest formulas with only 12 each. As recently as 1934 Alabama reported 60 grades. Alabama's record is regarded as outstanding, with farmers concentrating purchases on a 6-8-4 fertilizer particularly recommended by the State Experiment Station as desirable for many Alabama conditions.

"For the country as a whole, the leading fertilizer formula was 3-8-5 superseding 3-8-3 which led in popularity in 1925 and 1934. Up to about 1920 the relatively low analysis mixture 2-8-2 led in tonnage, but is now low in rank and going out of use. The 1-8-4 grade once popular is no longer listed separately. The second most popular grade last year was the 20-unit mixture, 2-12-6, which is gaining widely and may soon pass the 3-8-5. This grade was not listed in 1917 and stood 28 in order of tonnage consumed in 1925.

"Vermont is leading the trend toward use of high analysis fertilizers with more than one-sixth of its fertilizer in the 40-unit grade, 8-16-16. Maine ranked highest in the average of plant food units in its fertilizers, slightly less than 30, and South Carolina lowest with an average of only 16.04 units. Maine also used the largest proportion of mixed fertilizer.

"The survey distinguished between mixed fertilizers and fertilizer materials. In both groups, however, the survey notes a definite upward trend in the strength of plant foods to the ton. In general, all materials and mixtures contributing less than 16 units of plant food to the ton are losing popularity because cost of bagging and transportation is relatively high per unit.

"Standardization of grades offers opportunity for economies in manufacture, storage, and in stock requirements to supply demand. The survey shows that farmers are making progress in concentrating their purchases on fewer grades. In most states the leading grade now accounts for more than one-fifth of all the fertilizer sales, and in Mississippi, Missouri, Oklahoma, Ohio, Indiana, and Michigan—as well as in several western states where consumption is light—a single grade accounted for more than half of all the mixed fertilizers sold in 1939.

"The use of higher analysis grades of potash fertilizer materials has more than doubled since 1934, the report notes. Potash gains are particularly striking in the northern states. The phosphoric acid percentages of superphosphates are generally on the up-grade in most sections with consumers learning that it is cheaper per unit of plant food to buy the higher grade materials.

"A series of 14 comprehensive tables is included in the publication, which is regarded as giving a fairly complete picture of the present situation with respect to fertilizer consumption in the United States."

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

¶ This is another season of the year when thousands of home owners seek reliable information on the care of lawns, evergreens, and shade trees. The proper application of fertilizers and manure to prolong the life and beauty of these landscape essentials is but one of the many important considerations, but it is an operation that probably is least understood by the average layman. Among the recent publications pertaining to lawn and ornamental care, in which the plant-food requirements are specified, are: "Turf Management," Connecticut Experiment Station Circular 139, by M. F. Morgan, E. M. Stoddard, and J. P. Johnson; "Evergreens for the Home Grounds," Wisconsin Extension Service Circular 302, by Laurence G. Holmes; and "Feeding Shade Trees," Kentucky Extension Service Circular 341, by N. R. Elliott.

Even though the soil and climatic conditions vary considerably for the different regions represented in the above publications, as do the varieties and types of turfs and ornamentals grown, it is interesting to observe that the kinds of fertilizers suitable are quite similar. Fertilizers high in nitrogen with moderate amounts of phosphoric acid and potash are most commonly recommended both for lawns and trees.

Such analyses as 10-5-5 at 10 pounds per 1,000 square feet of lawn area, or 7-7-7 at 15 pounds, are advised in Connecticut. On the established turf, fertilizer should be applied in early spring at the recommended rate. It is frequently desirable to make an additional topdressing in early fall, especially if the turf has deteriorated during the hot summer months, using about half the spring rate.

Either 10-6-4 or 10-8-6 applied at the rate of one pound for each two feet in height of the evergreen will give good results, the Wisconsin circular states. The fertilizer should be broadcast at the base of the evergreen trees in early spring or late summer. A mulching of peat moss or leaf mold should be given every year. For shade trees, the 10-6-4 analysis is probably the one used most often in Kentucky, according to Professor Elliott. The amount to apply can be determined by measuring in inches the diameter of the trunk of the tree three feet above the ground, multiplying this figure by four, and using this number of pounds. The fertilizer can either be broadcast over the area, loosened by digging, or placed in holes around the tree made by a pipe.

"Manure Experiments With Vegetable Crops in Arkansas," Agr. Exp. Sta., Fayetteville, Ark., Bul. 392, June 1940, J. R. Cooper and Victor M. Watts.

"Fertilization of Lettuce on Alkaline—Calcareous Soils: Soil and Plant Studies," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 85, May 1, 1940, W. T. McGeorge, M. F. Wharton, and W. A. Frazier.

"Profits from Fertilizing Farm Crops, (The Results of a Twenty-four Year Experiment)," Ontario Dept. of Agr., Toronto, Ont., Canada, Bul. 410, Mar. 1940, A. W. Mason and G. P. McRostie.

"Fertilizers, Their Purpose, Nature, Purchase, and Use," Agr. Ext. Serv., Honolulu, Hawaii, Ext. Bul. 37, June 1940, L. A. Dean.

"Recommended Fertilizer Analysis," Agr. Exp. Sta., College Park, Md., 1940.

"Flue-cured Tobacco Fertilizer Recommendations for 1941," Agr. Exp. Sta., Raleigh, N. C., Agron. Inform. Cir. 127, Aug. 1940.

"Fertilizing Field Crops in Ohio," Agr. Ext.

Serv., Columbus, Ohio, No. 136, June 1940, Robert M. Salter and Earl Jones.

"Fertilizer Experiments with Rice in California," U. S. D. A., Washington, D. C., Tech. Bul. 718, April 1940, Loren L. Davis and Jenkin W. Jones.

Soils

¶ New York State Agricultural Experiment Station (Geneva) Bulletin 691, "Experiments in Orchard Soil Management: Fertilizers, Mulches, and Cover Crops," by R. C. Collison, contains an informative resume of this Station's recommendations on some of the orchard soil-management practices. Results of experiments on sub-surface placement of orchard fertilizers, the relation between fertilization and mulching and 7 years of cover-crop studies are included in this report.

Sub-surface placement of manure and fertilizer in an apple orchard over a 3-year period gave no better response than to the usual surface broadcast application. Until more is known of phosphorus and potassium-deficient soils in this State, the conclusion drawn is that the greater expense of placing the fertilizer in the root zone of trees is unjustified, judging from the results of this experiment. With reference to potassium and phosphorus use for orchards, the author says that while a consistently negative response has followed the application of these two elements as far as tree response is concerned, it must be kept in mind that the removal of fruit crops year after year, especially when increased in volume through nitrogen fertilization, sooner or later may cause a need for potassium and phosphorus. The orchard cover must also be considered, and this may be greatly benefited by phosphorus and perhaps potassium applications as well.

The investigations with nitrogen fertilization in a well-mulched McIntosh orchard on medium light soil indicated that applications normally recommended for unmulched orchards could not be used with a heavy mulch of non-legume material, without seriously affecting color and drop of fruit. Further studies on the more quantitative relations involved in this connection are planned.

A report on 15 different crops available for temporary or permanent orchard covers is given in the bulletin. A discussion of apple varietal response to fertilizers is briefly mentioned, but a more detailed report on this subject is reserved for a later publication.

"Ewing Soil Experiment Field, 1910-1939, General Summary of Results," Agr. Exp. Sta., Urbana, Ill., Mimeo., May 1940, F. C. Bauer and C. J. Badger.

"Newton Soil Experiment Field, 1912-1939, General Summary of Results," Agr. Exp. Sta., Urbana, Ill., Mimeo., May 1940, F. C. Bauer and P. E. Johnson.

"Toledo Soil Experiment Field, 1913-1939, General Summary of Results," Agr. Exp. Sta., Urbana, Ill., May 1940, F. C. Bauer and P. E. Johnson.

"Soil-building Practices in the 1940 AAA Program as They Apply to Iowa," Agr. Ext. Serv., Ames, Iowa, Feb. 1940

"Getting Alfalfa Stands on Sandy Soil," Agr. Ext. Serv., University Farm, St. Paul, Minn., Ext. Folder 84, Mar. 1940, George H. Nesom.

"Range Improvement Through Conservation of Flood Waters, a Report of Progress," Agr. Exp. Sta., Bozeman, Mont., Bul. 380, July 1940, O. W. Monson and J. R. Quesenberry.

"Soil Moisture, Root Distribution and Aeration as Factors in Nut Production in Western Oregon," Agr. Exp. Sta., Corvallis, Oreg., Sta. Bul. 372, June 1940, C. E. Schuster and R. E. Stephenson.

"Soil Conservation Pays, These South Dakota Farmers Say It Does," Agr. Ext. Serv., Brookings, S. Dak., Spec. Cir. 49, May 1940.

"Types of Vegetation in Escalante Valley, Utah, as Indicators of Soil Conditions," U. S. D. A., Washington, D. C., Tech. Bul. 713, May 1940, H. L. Shantz and R. L. Piemeisel.

"The Liming of Soils," U. S. D. A., Washington, D. C., Farmers' Bul. 1845, Mar. 1940, Edmund C. Shorey.

"Soil Survey, Davis County, Iowa," U. S. D. A., Washington, D. C., Series 1933, No. 32, June 1940, C. L. Orrben and G. A. Swenson.

"Soil Survey, Osceola County, Iowa," U. S. D. A. Washington, D. C., Series 1934, No. 19, Mar. 1940, C. L. Orrben, H. L. Dean, and G. A. Swenson.

"Soil Survey, Cattaraugus County, New York," U. S. D. A. Washington, D. C., Series 1935, No. 12, Mar. 1940, C. S. Pearson, J. C. Bryant, Wilber Secor, S. R. Bacon, Clarence Lounsbury, W. J. Camp, and C. B. Beadles.

"Soil Survey, Stokes County, North Carolina," U. S. D. A., Washington, D. C. Series 1934, No. 20, Feb. 1940, W. A. Davis and E. F. Goldston.

Crops

¶ Farmers and agricultural workers in Mississippi should profit materially by H. O. West's compilation of experimental and other reliable information on the best methods of producing peanuts, presented in Bulletin 341 of the Mississippi Experiment Station and the State Vocational Board, entitled "Peanut Production." The experimental information in this compilation includes appropriate material from a number of peanut-producing States and is supplemented with general information pertaining to the practices of peanut growers from a peanut-producing area. Such subjects as soils and climatic adaptations, land preparation, varieties, and fertilizers for peanuts are fully discussed. Interested farmers will also find information on how peanuts fit into the general cropping system, methods employed in planting the crop, cultivation, and the numerous other facts detailed in this publication.

"Methods and Rates of Planting Soybeans," Agr. Exp. Sta., Fayetteville, Ark., Bul. 390, June 1940, C. K. McClelland.

"Effects of Interplanting Legumes in Corn," Agr. Exp. Sta., Fayetteville, Ark., Bul. 393, June 1940, C. K. McClelland.

"Fiftieth Annual Report for the Year ending June 30, 1939," Agr. Exp. Sta., Tucson, Ariz., 1940.

"Home Floriculture in California," Agr. Ext. Serv., Berkeley, Calif., Cir. 53, Revised Jan. 1940, H. M. Butterfield.

"Varieties of Tree Fruits for Prince Edward Island," Dept. of Agr., Domin. Exp. Sta., Charlottetown, Canada, Pub. 706, Farmers' Bul. 97, June 1940, Dr. J. A. Clark and G. C. Warren.

"Sixtieth Annual Report of the Agricultural and Experimental Union, 1938," Ontario Dept. of Agr., Toronto, Ont., Can., 1939.

"Restoring Colorado's Range and Abandoned Croplands," Agr. Exp. Sta., Fort Collins, Colo., Bul. 459, April 1940, E. W. Nelson and W. O. Shepherd.

"Turf Management," Agr. Exp. Sta., New Haven, Conn., Cir. 139, Mar. 1940, M. F. Morgan, E. M. Stoddard, and J. P. Johnson.

"Grass and Legume Silage," Agr. Ext. Serv., Newark, Del., Ext. Cir. 43, June 1940, T. A. Baker and Kenneth W. Baker.

"Silver Anniversary Report, Florida Agricultural Extension Service, 1939, Report of General Activities for 1939 with Financial Statement for the Fiscal Year Ended June 30, 1939," Agr. Ext. Serv., Gainesville, Fla., 1939.

"Fifty-second Annual Report, Georgia Experiment Station, Experiment, Georgia, of the University System of Georgia, for the Year 1939-40," Agr. Exp. Sta., Experiment, Ga.

"Nineteenth Annual Report, 1938-1939," Ga. Coastal Plain Experiment Station, Tifton, Ga., Bul. 30, July 1939.

"Cover Crops in Soil Conservation," Agr. Ext. Serv., Honolulu, Hawaii, Agr. Ext. Cir. 90, July 1940, Norman King.

"Strip Crops," Agr. Ext. Serv., Honolulu, Hawaii, Agr. Ext. Cir. 94, Aug. 1940, Norman King.

"A Guide to the Agronomy Experiments, University of Illinois, 1940," Agr. Exp. Sta., Urbana, Ill., AG848, June 1940.

"Agricultural Extension Work in Indiana," (Annual Report, 1938-1939).

"Agricultural Extension Work in Indiana, Twenty-eighth Annual Report of Purdue University Department of Agricultural Extension," Agr. Ext. Serv., Lafayette, Ind., 1940.

"Asparagus, Its Planting, Care, Management," Agr. Ext. Serv., Urbana, Ill., Cir. 507, June 1940, Lee A. Somers.

"The Zinia," Agr. Exp. Sta., Lafayette, Ind., Cir. 254, May 1940, E. R. Honeywell.

"Gladiolus Culture in Iowa," Agr. Ext. Serv., Ames, Iowa, Bul. P12 (New Series), May 1940, L. C. Grove.

"Flora of Kansas," Agr. Exp. Sta., Manhattan, Kan., Contrib. 391, 1940, Frank C. Gates.

"Planning and Planting an Orchard," Agr. Ext. Serv., Lexington, Ky., Cir. 347, Feb. 1940, A. J. Olney.

"Silage from Hay Crops Making It . . . Feeding It," Agr. Exp. Sta., East Lansing, Mich., Cir. Bul. 173, July 1940, S. T. Dexter and C. F. Huffman.

"Harvesting Better Barley," Agr. Ext. Serv., East Lansing, Mich., Ext. Bul. 214, July 1940, H. C. Rather and A. B. Love.

"Soybeans and Winter Barley in One-Year Rotation," Agr. Ext. Serv., Columbia, Mo., Cir. 414, Feb. 1940, Ross Fleetwood.

"Twenty-five Years of Extension Work in Missouri with the Annual Report for 1939," Agr. Ext. Serv., Columbia, Mo., Cir. 420, June 1940.

"Fifty-third Annual Report of the Agricultural Experiment Station," Agr. Exp. Sta., Lincoln, Nebr., 1940.

"Varieties of Winter Wheat in Nebraska," Agr. Exp. Sta., Lincoln, Nebr., Bul. 326, May 1940, K. S. Quisenberry, O. J. Webster, and T. A. Kiesselbach.

. ."Varieties of Oats, Barley, and Spring Wheat in Nebraska," Agr. Exp. Sta., Lincoln, Nebr., Bul. 328, June 1940, T. A. Kiesselbach, O. J. Webster, and K. S. Quisenberry.

"Report of the Nebraska 1939 Corn Variety and Hybrid Tests," Agr. Ext. Serv., Lincoln, Nebr., Ext. Cir. 143, 1939.

"Annual Report of the Board of Control for the Fiscal Year Ending June 30, 1939," Agr. Exp. Sta., Reno, Nev., 1940.

"A Survey of Variability in White Clover (Trifolium Repens L.) and Its Relation to Pas-

ture Improvement," Agr. Exp. Sta., New Brunswick, N. J., Bul. 676, April 1940, Gilbert H. Ahlgren and Howard B. Sprague.

"Field-crop Experiments at Las Vegas, 1937-1939," Agr. Exp. Sta., State College, N. Mex., Bul. 271, May 1940, John Carter, Jr.

"New Lawns," Cornell Agr. Ext. Serv., Ithaca, N. Y., Bul. 429, Mar. 1940, Donald J. Bushey.

"Annual Report, North Carolina Agricultural Extension Service, 1939," Agr. Ext. Serv., Raleigh, N. C., 1940.

"Growing Small Grains in the Coastal Plain," Agr. Ext. Serv., Raleigh, N. C., Ext. Cir. 242, June 1940, E. C. Blair.

"Small Grains for the Piedmont and Mountains," Agr. Ext. Serv., Raleigh, N. C., Ext. Cir. 243, Aug. 1940, E. C. Blair.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XXV, No. 204, May-June 1940.

"Growing Vegetable Seedlings for Commercial Gardening," Agr. Ext. Serv., Columbus, Ohio, No. 103, April 1940, E. B. Tussing, J. H. Boyd, and I. P. Blauser.

"Farming with Soybeans for Marketing, for Feeding, for Land Use," Agr. Ext. Serv., Columbus, Ohio, Bul. 207, 1940, J. B. Park and J. A. Slipher.

"The Panhandle Bulletin: Production, Handling, and Feeding Sorghum Silage by Use of the Trench Silo," Agr. Ext. Serv., Stillwater, Okla., No. 66, Aug. 1940, Warren N. McMillen, Clyde H. Jamison, and Wright Langham.

"Coniferous Forest Plantings in Central Pennsylvania," Agr. Exp. Sta., State College, Pa., Bul. 394, April 1940, Donald D. Stevenson and R. A. Bartoo.

"Dehydrated and Sun-cured Hay," Agr. Exp. Sta., State College, Pa., Bul. 396, April 1940, S. I. Bechdel, A. W. Clyde, C. O. Cromer, and P. S. Williams.

"Annual Report for 1939 Agricultural Extension Service Rhode Island State College," Agr. Ext. Serv., Kingston, R. I., Bul. 78, Feb. 1940, Raymond G. Bressler.

"New Hardy Fruits for the Northwest," Agr. Exp. Sta., Brookings, S. Dak., Bul. 339, June 1940, Niels E. Hansen.

"Grape Production in Texas," Agr. Exp. Sta., College Station, Brazos County, Tex., Cir. 89, June 1940, E. Mortensen and U. A. Randolph.

"Care and Planting of Small Trees," Agr. Ext. Serv., Pullman, Wash., Ext. Cir. 29, Feb. 1940, James W. Stubbs.

"Winter Rye, Growing & Feeding," Agr. Ext. Serv., Madison, Wis., Cir. 301, June 1940, E. J. Delwiche, A. R. Albert, and G. Bohstedt.

"Evergreens for the Home Grounds," Agr. Ext. Serv., Madison, Wis., Cir. 302, June 1940, Laurence G. Holmes.

"Bean Growing in Northern Idaho, Eastern Washington, & Eastern Oregon," U. S. D. A., Washington, D. C., Farmers' Bul. 1509, Feb. 1940, Byron Hunter.

"The Culture and Use of Sorghums for Forage," U. S. D. A., Washington, D. C., Farmers' Bul. 1844, Mar. 1940, J. H. Martin and J. C. Stephens.

"Cotton-Tillage Studies on Red Bay Sandy Loam," U. S. D. A., Washington, D. C., Cir. 540, Apr. 1940, John W. Randolph, I. F. Reed, and E. D. Gordon.

"S X P Cotton in Comparison with Pima," U. S. D. A., Washington, D. C., Cir. 550, April 1940, T. H. Kearney, R. H. Peebles, and E. Gordon Smith.

"The Oriental Persimmon," U. S. D. A., Washington, D. C., Leaf. 194, May 1940, H. P. Gould.

"Blueberry Culture," U. S. D. A., Washington, D. C., Mimeo., George M. Darrow.

"Gardenia Culture," U. S. D. A., Washington, D. C., Mimeo., Guy E. Yerkes, Furman Lloyd Mulford, Lucia McCulloch, and Floyd F. Smith.

"1939 Orange County Avocado Production Cost Analysis, Ten Year Summary, 1930-1939," Agr. Ext. Serv., Berkeley, Calif., No. 1-500.

"Orange County Lima Bean Cost Analysis, 1939, Twelfth Annual Summary," Agr. Ext. Serv., Berkeley, Calif., No. 1-175.

"Orange County Sugar Beet Cost Study, 1939, Fourth Annual Summary," Agr. Ext. Serv., Office of Farm Adviser, Santa Ana, Calif., No. 1-200.

"Connecticut Fruit and Vegetable Marketing Handbook, 1940," St. Dept. of Agr., Hartford, Conn., Bul. 66, 1940, Brainerd T. Peck.

"Connecticut Crop and Livestock Review 1939," St. Dept. of Agr., Hartford, Conn., Bul. 67, June 1940.

"A Discussion of Apple Production Costs," Agr. Exp. Sta., Storrs, Conn., Pomology Leaf. 1, Mar. 1940, Wesley P. Judkins.

"Agricultural Land-Use Planning in the Territory of Hawaii," Agr. Ext. Serv., Honolulu, Hawaii, Ext. Bul. 36, June 1940, John Wesley Coulter.

"The Organization and Management of 95 Dairy and Cash Crop Farms in Androscoggin and Oxford Counties, Maine," Agr. Exp. Sta., Orono, Maine, Bul. 398, Feb. 1940, Andrew E. Watson and Emil Rauchenstein.

"Agricultural Production and Types of Farming in Minnesota," Agr. Exp. Sta., University Farm, St. Paul, Minn., Bul. 347, May 1940, Selmar A. Engene and George A. Pond.

"Statistical Supplement, Agricultural Production and Types of Farming in Minnesota," Agr. Exp. Sta., University Farm, St. Paul, Minn., Sup. to Bul. 347, May 1940, Selmer A. Engene and George A. Pond.

"Uncollected Property Taxes in Montana, An Analysis of the Amount, Growth, Causes, and Means of Reducing Montana Property Tax Delinquency with Special Emphasis on Rural Property," Agr. Exp. Sta., Bozeman, Mont., Bul. 382, Aug. 1940, R. R. Renne and O. H. Brownlee.

"Studies in Economics of Apple Orcharding, III, A Study of Orchard Problems by the

Budget Method of Analysis," Agr. Exp. Sta., Durham, N. H., Bul. 323, June 1940, H. C. Woodworth and G. F. Potter.

Economics

¶ Those of us interested in learning more about our insular possessions will find "An Economic Background for Agricultural Research in Puerto Rico," by E. B. Hill and S. L. Descartes, interesting reading. The above study appears as Bulletin 51 of the Agricultural Experiment Station at Rio Piedras, Puerto Rico. Although the study was undertaken and written for the purpose of analyzing the agricultural problems of the little insular territory, it contains much interesting information relative to the agricultural practices and economic problems of the Island. Agriculture is the chief occupation, with industrial activity on only a small scale and mostly limited to the processing of agricultural crops.

Exports are extremely important, because the local market can consume only a small part of the total agricultural production of the Island. Agricultural exports constituted about 90% of the total net exports for the year 1937-38, and the 1929-38 average yearly exports amounted to approximately $90,000,000. Imports amounted to something like $78,500,000 annually between 1929 and 1938. According to the 1935 census, 53% of the workers are employed in agriculture and in the processing of agricultural commodities. Employment has been adversely affected as a result of the shrinkage of export markets, reciprocal trade agreements, and the wage and hour law. The writers point out that the physical and economic factors favor an agricultural rather than an industrial economy. The absence of fuel and mineral resources is a severe handicap to industry.

According to the bulletin, the dense population of Puerto Rico, about 540 people per square mile, is the chief cause of the relatively low productivity per man and affects all aspects of Puerto Rican lives.

About 90% of the land area of the Island is in farms, and according to recent farm-management studies, there is an intensive use of pasture land. Pasture furnishes the major food for livestock, with very little concentrates being used. It is also pointed out that density of population has resulted in the cultivation of areas of land which in less densely populated countries would be considered too rough and stony for crops.

Restrictions on the production of sugar and tobacco have resulted in a shift of some of the land in these crops to less intensive use, such as pasture. It appears that since 1909, sugarcane has not tended to replace food crops. The area of food crops per capita was about the same in 1935 as in 1909, despite a large increase in population, but the same area planted to sugarcane yields more income in terms of food that it can buy than the same land planted with food stuffs would yield. In recent years sugarcane has constituted about 75% of the exports of the Island and has provided employment for around 125,000 workers. Puerto Rico's productive capacity for sugar is considerably higher than its export quota.

Coffee, once a leading export of the Island, has declined in importance in recent years, but the coffee industry still provides employment for about 45,000 workers and contributes about 6% of the total gross farm income of the Island. No satisfactory crops have been found to replace coffee in the mountainous lands of the interior western region, even though the income from the coffee farms has not been enough to cover expenditures, interest on investment, or provide any sort of satisfactory reward for the farmer's labor.

The Puerto Rican tobacco farmers have suffered considerably from the decline in the per capita consumption of cigars in the United States and the shift from high priced to a lower priced cigar. The area in tobacco has declined, and prices have been unsatisfactory.

About $1,500,000 worth of pineapples

were exported annually between 1930 and 1939, and only $1,000,000 worth in 1938-39, due to more competition with Cuba, a 20¢-per-crate reduction in tariff rates to Cuba in 1934, and lower quality fruit. Considerable quantities of grapefruit are produced and exported, both fresh and as canned grapefruit, to the United States. Other important crops include cocoanuts and vegetables, such as cucumbers, tomatoes, and peppers. Although large quantities of food are imported, Puerto Rico produces about 85% of the beef, 37% of the pork, 86% of the poultry, and all of the fresh milk consumed on the Island. Meat and milk consumption per capita is low, because of the low purchasing power of so many of the people.

"Analyses of Commercial Fertilizers, Manures, and Agricultural Lime, 1939," Agr. Exp. Sta., New Brunswick, N. J., Bul. 674, Feb. 1939, Charles S. Cathcart.

"Fundamental Principles Essential to the Development of Agriculture in North Carolina," Agr. Ext. Serv., Raleigh, N. C., Ext. Cir. 240, May 1940, John W. Goodman.

"Some of the Economic Effects of Soil Conservation in the Salt Creek Watershed, Zanesville, Ohio, 1934-38," Agr. Exp. Sta., Columbus, Ohio, Mimeo. Bul. 124, Apr. 1940, R. H. Blosser.

"Rural Tax Delinquency Study of the State of Oregon," Corvallis, Oreg., Sta. Bul. 371, June 1940, W. H. Dreesen.

"Inspection of Fertilizers Made for the State Department of Agriculture and Conservation," Agr. Exp. Sta., Kingston, R. I., An. Fer. Cir., Contr. No. 564, Jan. 1940, W. L. Adams and T. Wright, Jr.

"Report of Inspection Work Commercial Fertilizers," St. Dept. of Agr., Charleston, W. Va., Bul. (N. S.) 19, July 1, 1940.

"Results of County Agricultural Program Planning," Agr. Ext. Serv., Madison, Wis., Cir. 306, June 1940.

"The United States Department of Agriculture, Its Structure and Functions," U. S. D. A., Washington, D. C., Misc. Pub. 88, Revised May 1940, A. P. Chew.

"A Brief History of Agricultural Adjustment in the United States," U. S. D. A., AAA, Washington, D. C., Ext. Serv. Cir. 333, May 1940, R. L. Burgess.

"The A. A. A. Wheat Program in Operation," U. S. D. A., AAA, Washington, D. C., G-101, Gen. Inform. Series, July 1940.

"Land Use Planning Under Way," U. S. D. A., Washington, D. C., July 1940.

"County Land Use Planning," U. S. D. A., Washington, D. C., County Planning Series No. 1, Mar. 1940.

"Membership of Land Use Planning Committees," U. S. D. A., Washington, D. C., County Planning Series No. 2, April 1940.

"The Land Use Planning Organization," U. S. D. A., Washington, D. C., County Planning Series No. 3, May 1940.

"The Scope of Land Use Planning," U. S. D. A., Washington, D. C., County Planning Series No. 4, 1940.

"Pooling Ideas in Land Use Planning," U. S. D. A., Washington, D. C., County Planning Series No. 5, 1940.

"Communities and Neighborhoods in Land Use Planning," U. S. D. A., Washington, D. C., County Planning Series No. 6, 1940.

"Rural Zoning and Land Use Planning," U. S. D. A., Washington, D. C., County Planning Series No. 7, 1940.

Legume-Grass Mixtures Best

LEGUMES form a valuable part of almost any soil-conserving program, but they should not be regarded as a cure-all for soil erosion troubles, says C. R. Enlow, chief agronomist of the Soil Conservation Service. Pure seedings of leguminous plants have been found at soil conservation experiment stations to be considerably less effective for erosion control than mixtures of legumes and grasses.

Enlow points out further that not all legumes are good soil-binders. Soybeans for example, have a tendency to loosen the soil, a condition favorable to erosion damage. Experiments have shown that soil losses under a soybean crop run about as high as under corn in a 3-year rotation with barley and clover.

In short, says Enlow, the mere fact that a plant is leguminous is no guarantee of its soil-holding capacities. The ability of any hay crop to check erosion depends primarily on the density of its growth and its sod-forming qualities.

Foreign and International Agriculture

To supply information on agricultural research and practice in other countries, brief abstracts of articles in foreign publications are given here. Due to space limitations, only articles of general fundamental interest are included, although the publications may contain other articles and reviews.

Die Ernährung der Pflanze, Vol. 36, No. 5, May 1940.

The Influence of Potash Additions on Starch Formation. *By K. Schmorl, Coburg, Germany.*

The starch content and other characteristics of plants can be influenced within certain limits by selection and breeding for the desirable factors, but the fertilization of the plant can also influence these characteristics in many cases. The influence of potash fertilization on starch content of grains has been shown in field experiments, and also in laboratory investigations of the grain. In this connection, it is pointed out that in studying the influence of potash fertilization on a crop, the properties of the soil, particularly with respect to fixation of potash, must be taken into consideration, since the plant may be actually getting considerably less potash than is assumed.

The starch in the grain or in potatoes should not be considered merely as an organic carbohydrate, since certain amounts of phosphoric acid, potash, and calcium are always connected with it. The connection of these mineral substances with the starch is an indication of their importance in the formation of the starch, even as nitrogen is connected with protein formation. The starchy plants always have a higher ash content with a higher starch content. Data are given showing the increasing ash, potash, and phosphoric acid content of potatoes with increasing starch.

The wheat grain consists of several parts, and in milling, the outer coverings are separated from the inner starchy parts to a greater or lesser degree. The finest flour consists mostly of the inner parts, the coarser flours containing more of the outer parts of the grain. Analysis of the flour shows that the ash and phosphoric acid increase with the coarseness of the flour, while the potash increases with the fineness of the flour.

Curves are given showing the range of the gluten content, and swelling, test, and total quality figures for three grain varieties. While there was a marked tendency for the three varieties to differ in these characteristics, the curves overlapped in all cases. Potash fertilization was found to have a marked influence also on the figures, a case being mentioned by the author where the swelling figure for the gluten from grain without potash was 9 and with potash, 21. The great importance of this nutrient for various crops, in conjunction with other nutrients and factors necessary for good crop development, is mentioned.

The Agricultural Problems of Greece. *By K. Nevros, Athens, Greece.*

One of the big problems of Greece is to increase grain production so as to make the country self-sufficient in grains. To do this, cultural practices will have to be improved. This will include better land utilization, better fertilization, improved varieties, and more modern growing practices. Many of the soils have become impoverished from lack of fertilization combined with soil erosion due to a one-crop system of farming and poor soil management.

The fertilizer problem is complicated by the high lime and iron contents of the soils and periods of drought favor-

ing fixation of the nutrients. Proper placement of seed and fertilizer, and irrigation will help solve these problems. The wheat should be drilled instead of broadcast, especially since this permits the hoeing of the crop, highly necessary under conditions in this country. The more intensive cultivation of grains would permit transferring some of the acreage now devoted to this crop to other important crops, and still increase total grain production.

About one-fifth of the total area of Greece is under cultivation. Of this area, about two-thirds is in grain, including wheat, rye, corn, rice, and millet, about one-fifth in beans and other legumes, about 3.3% in vegetables, 8.6% in cash crops as tobacco, cotton, spices, etc., 5% in forage crops, and 11% in vineyards of various types. Reforestation of much land should be undertaken, although some progress in this respect already has been made.

INVESTIGATIONS ON THE RELATIONSHIPS BETWEEN DRY MATTER PRODUCTION AND CARBONIC ACID LIBERATION BY THE ROOTS OF CORN. *By F. Alten and R. Gottwick, Berlin, Germany.*

Corn plants were grown in water culture in special apparatus, whereby the roots and solution around them were excluded from all contact with air except that supplied under experimental control. The carbon dioxide given off by the roots under different conditions of nutrition, light, and season was measured, and the plant weight and analysis were determined. The results showed that under similar conditions, about equal amounts of CO_2 were given off for a given production of organic matter. Under the poorer light conditions in winter, about twice as much CO_2 was given off per unit weight dry matter as under favorable light conditions in the spring and summer.

Increasing amounts of potash in the nutrient solution increased the production of dry matter, and also the CO_2 given off, but not in the same ratio as the increase in dry matter. Increasing the nitrogen application increased the production of dry matter and CO_2 in about the same ratio. When extra nutrients were added to plants growing in solutions too weak for normal growth, dry matter and CO_2 production increased, but the ratio of the two tended to be the same as when the plants were grown under more favorable conditions from the beginning. During the night, CO_2 production did not decrease so much with plants growing in solutions containing more nutrients. The question as to whether plants with better nutrient supply are less affected by light deficiency could not be answered from the work.

As a general conclusion, the authors advance the indication that plants well supplied with potash are able to utilize more efficiently the CO_2 they absorb in the production of organic matter.

THE UTILIZATION OF AGRICULTURAL LAND IN GERMANY.

The acreages of individual crops, pastures, fallow, forests, and unproductive land for greater Germany for 1938 and 1939 are given. The listing is very detailed and complete.

GERMAN FRUIT PRODUCTION IN 1939.

The total production of fruits in Germany is given for the year 1939, and per tree for each of the last seven years.

Annales Agronomiques, Vol. 10, No. 1, January-March 1940.

COMPARATIVE STUDIES ON THE BIOLOGY OF THE SOILS OF THE NORTH AND CENTRAL SAHARA. *By C. Killian, Beni-Ounif, Algiers.*

This paper describes part of a series of studies on the soils of the Sahara Desert. Physical, chemical, and microbiological investigations of the different groups of soils are summarized and discussed. Many interesting and at times perplexing facts were found. These frequently appear quite anomalous to one better acquainted with humid than with arid soils. The author brings out

that microbiological factors are much more important in arid soils than is commonly recognized. He found Azotobacter quite generally distributed, and nitrifying organisms not quite so general, since these could not withstand lack of aeration in soils as well as the Azotobacter. Nitrogen is of great importance and significance in the soils. Carbon is not so important as in humid soils, and carbon/nitrogen ratios are of less significance. Phosphates and potash in many cases were high, while the reaction was usually mildly alkaline.

OBSERVATIONS ON THE ORIGIN AND CONSTITUTION OF THE SOILS OF FRENCH EAST AFRICA. *By H. Scaetta, Brussels, Belgium.*

The author describes and discusses the groups of soils, their profiles, characteristics, and modes of formation.

A REVIEW OF PHYTOPHARMACY. *By M. Raucourt, Versailles, France.*

Measures followed in numerous countries to control the purity and efficiency of commercial insecticides and fungicides used in agriculture are briefly reviewed. Various newly developed arsenicals and organic insecticides are described, and their action, value, and dangers discussed. Materials added to the poisons as spreaders, adhesives, and emulsifiers also are given consideration. A rather full bibliography is appended.

Sweetpotato Research Broadens Step by Step

SWEETPOTATO starch offers a good example of the kind of results that may come from scientific research, says James T. Jardine, Director of Research, United States Department of Agriculture.

The original problem put to the chemists of the Department was to devise a practical and economical process for making sweetpotato starch. This part of the problem has met with considerable success, although scientists are still improving the process. The starch is a quality product in demand on the market, and manufacture is expanding. The byproduct pulp may be utilized advantageously as stock feed.

The first starch making was seasonal and lasted only a few weeks during the harvesting season. This created problem two, to find a way to use the raw material over a longer season and thus cut overhead expense. Research was started to develop chemical and heat treatments to take out of the ground potatoes enough water so the product would keep. The work on this is already under way and has pointed to a third problem, using dried potatoes for livestock feed.

If dried sweetpotatoes could be kept for year-round feeding, the sweetpotato could come to be one of the most important feed crops of the South. Yields of sweetpotatoes compare favorably in total food values with yields of corn. If sweetpotato drying can be made cheap enough—perhaps through community drying plants—feeders may not need to depend on the byproduct pulp of starch manufacture, but may grow sweetpotatoes for drying without extracting the starch, thus producing a livestock feed that is cheaper for the South than corn.

While the chemists are wrestling with these problems, plant breeders are developing new strains of high-yielding sweetpotatoes that are rather high in starch.

Drought Years Favored Weed Rivals of Crops

THE "weed problem" on American farms has changed radically in the last generation, according to L. W. Kephart, in charge of weed research in the Federal Bureau of Plant Industry. From concern over cultivation of annual weeds in tilled crops, interest has shifted chiefly to the "noxious weeds," mainly perennials which have been spreading alarmingly.

Fifteen years ago the noxious weed areas did not greatly exceed 1,000,000 acres, Kephart estimates. Now these weeds have "taken" about 6,000,000 acres of good farmland west of the Mississippi, with crop production checked or prevented, not only on single farms, but in whole townships.

Two factors have played a great part in this spread, Kephart finds. Since 1930 an unusual series of dry years has proved extra favorable for seed production by the weeds. Economic depression increased farm tenancy and a general let-down in farm care. "The indications are," says Kephart, "that the present situation will not greatly improve and that noxious weeds will continue to increase, unless vigorous measures are taken to combat them."

The situation has roused many farmers. The Federal Seed law has been made more effective. Thirteen States have adopted new laws or revised old laws on weed control, and eight States are cooperating with the Bureau of Plant Industry in weed-control research. The first important achievement was development—as a direct result of research—of a method of bindweed eradication that produced better results with half the labor as a result of better timing of cultivations—at intervals of 14 to 20 days, instead of every 7 or 8 days.

Master Farmers Strong on Soils & Livestock

(*From page* 21)

are corn, oats, rye, soybeans, and cottonseed meal from the farm. Cash from poultry and cattle is only less important than that from hogs. True, the hens and the cows are primarily for good family eating, but they are a big help in providing supplementary cash.

Experience has shown Ross that feeding out steers on feeds grown on the farm is profitable because: first, there is some net cash resulting; second, they are a market for by-product feedstuffs that might otherwise be worthless; third, the resulting manure is a great land conditioner and enricher.

Modern, well-equipped dairy barns house a high quality herd of 100 Guernsey dairy cattle on the farm of Master Farmer Ben M. Gramling of Spartanburg County; and 150 acres of permanent pasture and more acres of temporary grazing keep the herd well fed and productive. Registered purebred sires keep the herd one of the best to be found in Guernseydom.

Always ready to pioneer in farming ventures and diversify his interests, Mr. Gramling has recently acquired 1,000 acres of land in Laurens County, on which he has established beef cattle with purebred Hereford bulls and native cows. He is, of course, building up pasture land and temporary grazing crops for economically feeding these cattle.

Potato Growing Trends

(*From page* 12)

the amounts of plant food applied by club members. In 1939 the average application was 2,357 pounds of 20-unit equivalent, with a maximum of 2,900 pounds per acre. There seems to be a firm determination on the part of our potato men not to allow their plants to suffer for want of plant food. As operations on potato farms have expanded, manure has become less and less important as a source of fertility for potatoes. Only 5 men out of 28 report having used manure directly for potatoes. Three of these did not limit their fertilizer because of its use, one man cut his fertilizer to about three-quarters of a normal application, and one grower applied no fertilizer at all. This latter grower uses 20 tons of manure to the acre over all his crop land each year, regardless of the crop grown.

A few years ago we reported that club members were about evenly divided in the matter of high and low analysis fertilizers. In 1939, 18 growers used nothing but high analysis goods, 5 used low analyzing mixtures, and 3 applied medium analysis materials, (25-35 units), while one grower divided his application between 20 and 40-unit goods. The initial savings in buying high strength materials and the savings in cartage and labor of application have a distinct appeal.

Recent agreements in the fertilizer trade to manufacture more grades running in the medium analysis group may have a tendency to check the stampede into materials approximating 40 units of plant food. But as anyone can readily see, the trend is definitely away from the 20-unit materials which formerly ranked as favorites with potato growers.

In the April 1939 issue of "Better Crops" I discussed at some length the fertilization of potatoes under the title, "Fertilizing Potatoes in New England." In this article I pointed out that a 300-bushel crop, leaves and tops, takes more nitrogen and somewhat more potash than is furnished by a ton of 5-8-7 fertilizer, a formula that still leads all others in quantity sold in this important potato-growing area. I also pointed out that although a ton of 5-8-7 carries more phosphoric acid than is used by such a crop of potatoes, the fact that an unknown but very large percentage of applied phosphoric acid is fixed and not recovered at least in the immediate growing crop, makes it always wise to apply an excess of this growth-promoting substance.

Aim for Higher Yields

These potato growers who depend upon chemical rather than farm-produced fertilizers are not satisfied with the prospect of producing 300 bushels of potatoes per acre, but always have the hope of some higher yield in mind. Many of these hopes come to fruition in the autumn at harvest time. Since the aim is always high and since they do not wish the lack of plant food to limit their yields, they use more than a ton of fertilizer, and as our average figures now show have arrived close to the 2,400-pound mark, measured in 20-unit plant food.

Meetings of potato growers recently held in many New Hampshire counties decided upon this 2,400-pound application as a maximum recommendation, although many of the growers present indicated they would probably exceed this figure in 1940 as they did in 1939, especially in the higher analyses. These growers recognized the fact, of course, that a dairyman might cut this amount to some extent in view of the manure he applies, and they voiced the opinion, too, that if a farmer's financial condition did not permit his taking risks, it might be better for him to hold his application around the

ton mark for single or the half-ton mark for double strength goods.

This means then that the range of our recommendations for 1940 was about as follows:

Formulas	Amounts (lb. per Acre)
5–8–7, 4–8–10, and similar formulas.....	2,000–2,400
5–10–10 " " "	1,600–2,000
8–16–16 " " "	1,000–1,200

There is no small amount of interest amongst our growers in the ratio of elements to be applied. Most of them have followed the experimental work we have done, which indicates that high phosphorus and potash in relation to nitrogen often increases yields, and there is a growing interest in this idea as well as an interest in the materials that actually are used to compound the fertilizer. Because of this interest, sulphate of potash, bone meal, organics, and other materials are coming under the scrutiny of these potato growers in actual field tests.

Insect and Disease Protection

A slight tendency toward dusting for insect and disease protection was noted in 1939. This is probably due to advances made in power dusters that can be mounted directly on the tractor and operated with a power take-off, thus eliminating the necessity of having two implements run over the vines. Vine lifters can easily be attached to the tractor to avoid injury, and these aids are appearing in many fields.

Some of the insect and disease problems seem to be pretty well solved, others are still aggravating. Late blight is easily controlled with liquid bordeaux or copper lime dust, except in rain-soaked and sodden fields, such as existed at the time of the 1938 hurricane. Colorado potato beetles are quickly killed with arsenicals. But the two small insects, flea beetles and leaf hoppers, still do a tremendous lot of damage in practically all fields and are the worst enemies of the potato grower at the moment. Although bordeaux has some repellent and toxic effect against hoppers, and flea beetles do not fare so well when vines are covered with arsenic, even our most careful and efficient spray operators are experiencing a great deal of commercial damage from these two minute but multitudinous pests.

There is hope on the horizon, however, since tests conducted during 1939 in New Hampshire in a limited way have clearly proved that one of the old insecticides combined with a new carrier is completely effective against flea beetles and apparently gives fairly good control of the leaf hopper situation. One grower reports that a single application of this new material kept the sprayed portion of his field in a green and growing condition one month longer than the unsprayed portion, and increased his yield then by more than 100 bushels per acre. When the proponents of this material finally perfect it and get it out to farmers for use in their fields, potato yields will undoubtedly increase. When this time comes, we will probably be reporting 600-bushel yields as glibly as we speak of those in the 500-bushel class today.

Always provided, of course, that some new disturbing factor doesn't appear on the horizon, and one seems to be on the way. Erosion. Shortening the potato rotation appears to reduce organic matter and absorbing properties of the soil for water. Changes in the rotation which involve keeping land in potatoes a greater proportion of the time render the soil more vulnerable to washing. Two of our 300-bushel club growers are already practicing erosion control methods by means of terraces and cropping in strips on the contour, and other men may have to follow their example.

Most of the potatoes in New Hampshire and in New England, for that matter, are grown on heavy, sloping, hill land, land that is susceptible to erosion if exposed. If our farmers realize the dangers from this source before the value of their soils is too seriously reduced, it will be a credit to their foresightedness.

It isn't likely that a keen-minded group such as these men will fail to recognize the damage erosion causes in these new cropping systems. They are very alert in adopting new methods or ideas which they think will improve yields or enhance profits. That they have made progress in the last dozen years is beyond question. That they will continue to improve both in methods and quality is certain.

Building Better Soils

(*From page* 22)

The early settlers in America found a goodly inheritance in the soils of the country. Too often they failed to appreciate the soil wealth that was theirs, and treated it as one treats a mine—took from it all they could get without thought of returning anything. Worse yet, they frequently burned the fine timber and with it the very valuable organic matter contained in the layer of woods-mold underneath the carpet of leaves.

Who that has read the history of agriculture during the last half of last century and has learned how thousands of families deserted the farms of New England, New York, and other eastern sections, migrated westward, took up fertile virgin lands, farmed them until they had taken out the cream of fertility, then moved on again to take up other new lands, and repeat this process many times over, can fail to realize how destructive agriculture can be? Perhaps there is no clearer picture of this process of land destruction than that drawn by the late Hamlin Garland in his book "A Son of the Middle Border."

It was no less an authority than Sir John B. Lawes, founder of the great experiment station at Rothamsted, England, who in discussing farming in the United States in 1881 said: "It is not however the corn (wheat) grown in the United States by purchased fertility, or even by the manures made upon the farm, that the British farmer need fear as likely to compete with him. The danger lies in the vast stores of unused fertility, which constitutes the main wealth of the United States; and this fertility, as I have already pointed out, is very much cheaper than any derived from artificial or imported sources."

Sir John knew much better than most Americans of that time, that we were mining our fertile western lands, and that we were using that "mined" wealth to sell our wheat in the British market at a price that was difficult for the British farmer to meet. To some extent we have learned our lesson and are retracing our steps in an effort to rebuild the depleted soils. We are learning that the organic matter which George Washington so carefully reclaimed from the pocosons and river banks, is vital to any sustained and successful agriculture. We are learning that under the natural forest floor, nature provided a soil well balanced in nutrient materials, and that when we disturb this balance by long-continued clean culture, without restoring the organic matter and mineral elements, especially calcium, phosphorus, and potash, that have been lost through crop removal and natural destructive forces, we are headed for a badly depleted soil which cannot possibly return a fair living for the owner, just as surely as a run on a bank will finally deplete the resources of that institution to such

an extent that it cannot longer continue to exist.

Fortunately, many bankers and other business men are awake to this situation, and are cooperating with farmers in working out a solution for this great problem. The fact that certain insurance companies have taken over large areas of farm lands, and are so managing them as to get a fair return on the money invested, is proof that it is possible to reclaim land that has been badly managed. The principles underlying good soil management are now well known, and information on this subject is to be had from the various agricultural colleges and experiment stations throughout the country.

Rebuilding lost fertility in the soil is not done by easy, short-cut methods. It must be done in the hard way, but it can be done. It is, however, a problem to challenge the best there is in the American farmer.

Using Soil Tests for Canning Crops

(*From page* 17)

the row, this soil produced 14.6 tons of excellent quality fruits.

From these studies in southwestern Ontario and from similar work elsewhere in the Province, the author believes that the rapid chemical soil tests now in use at the Ontario Agricultural College give a reliable indication of the fertility levels of this area. The approximate amounts of nutrients (as indicated by soil tests) considered necessary to produce an average crop of tomatoes are given in Table III.

TABLE III

Amounts of Nutrients Present in the Soil Necessary to Produce an Average Crop of Tomatoes

pH	6.0 to 7.5
Ca	800 or more lb. per acre 6 in.
Mg	40 or more lb. per acre 6 in.
P_2O_5	80 or more lb. per acre 6 in.
K_2O	400 or more lb. per acre 6 in. (High Test)
Active organic matter—Clays and clay loams	3% or more
—Loams	2.5% or more
—Sandy soils*	1.5% or more

* Not recommended for growing high quality canning tomatoes in Essex on account of disease infestation.

While rapid chemical soil tests are very valuable in soils work, they are not infallible. Factors other than nutrient supplies in the soil are very important in determining yield, cultural practices in the rotation, etc. Alfalfa and clovers ploughed into the soil immediately previous to planting may be a good practice for growing potatoes, but not for tomatoes. This should be done the year previous to the tomato crop, as large additions of organic matter added in the spring too often limit the available moisture necessary for crop production. However, the soil tests do provide information that cannot be obtained in any other way.

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Swing Back to Grass

(*From page* 9)

fied. It is known, however, that it did not long survive as such. The lazy, shiftless habits which the system encouraged, and into which many in the Virginia colony drifted after the departure of Captain Smith, were soon uprooted and gave way to individual initiative and effort. It was this change of policy which gave the early settlers new hope and inspired them to forego hardships and privation, knowing that their own efforts would bring them the greatest possible measure of security.

Bountiful crops everywhere were their reward. After the harvest of 1623 the Massachusetts colonists held special meetings to give thanks for the many blessings which had come to them from their work. It had been made plain to everyone that to avoid hunger and possible starvation he must work to produce food, for food was first in importance to Colonial America. From that time to the present, most men have sought to produce abundantly for their own and the welfare of others.

During the early part of the seventeenth century, oxen and horses came into more general use to aid and make easier the production of food and feed. In 1637 Edward Johnson wrote, "It was with sore labour that one man could Plant and tend foure acres of Indian Graine and now with two Oxen hee can Plant and tend 30." Farming among the colonists became much more successful as they put more faith in livestock and poultry, which first served as food and clothing, and later as sources of farm power and great wealth.

The experience of the colonists, regardless of nationality, brought the same conclusion, that self-sufficing agriculture alone was not enough to give them the necessities of life and some of the desired extra comforts. As soon as the family needs had been met, the pioneer farmers began to find a demand for their meat animals, milk cows, work oxen, and horses, and for dairy and poultry products of all kinds. From the disposal of their surplus products and livestock, commerce and industry came into being. The larger settlements and towns furnished an increasing demand, then the trade with neighboring islands, provisioning ships touching the coast, and later shipments to other countries grew, until a sizable commerce had been built up.

It was often stated that the principal reason why Captain John Smith and Governor Dale never favored the growing of tobacco extensively by the Virginia colonists was that it interfered with the production of food and feed. Their philosophy was, "In tobacco farming some grow rich but many become poor."

Following the departure of Governor Dale and the coming of Governor Argall, Captain George Yardley took charge of the colony as deputy for a year, later becoming governor. He removed the restrictions on growing tobacco and enlarged the holdings of the colonists in accordance with their ability to pay for the land. Tobacco growing became increasingly important, resulting in a very large crop in 1617. It was about the only crop which the English backers of the colony especially wanted from America at that time. Being of a better quality than could be obtained elsewhere, special

inducements were offered the producers.

While some of the colonists were greatly increasing their tobacco plantings, many were enlarging their holdings and developing a diversified farm program. By 1629 both cattle and hogs had greatly increased in numbers. With more liberal inducements for gaining title to land, the colonists prospered and continued to clear more land and build new and better houses.

The first real setback to tobacco growing came in 1630, when the price fell to practically nothing. It was then that diversified farming came to the rescue and really showed what it could do. Livestock of all kinds, cattle, hogs, sheep, work stock, and poultry, and the production of fruits and vegetables became general throughout the colony. The struggle of the one-crop tobacco farmers finally attracted the attention of the English Government. In 1703 Robert Quary was sent to investigate the conditions among the colonists. In his report of the conditions which he found was this significant statement, "Their almost sole business is planting and improving tobacco, even to the degree that most of them scarce allow themselves time to produce their necessary provision."

While tobacco did and has played an important part in the early history and later development of Virginia, it was by no means the most important. It may be fairly stated that it was corn which made Virginia farming profitable, as it has in other large regions of America. It not only made Virginia great and strong as a colony, but actually saved it as such from starvation and famine on several occasions during the first few critical years of its existence.

A grass sod holds the top-soil in place, even where dust storms are prevalent.

It was not so much as a food for man that it served the State so well, but it brought about diversified farming, and diversification saved Virginia as it has many other regions. Corn as an individual crop had many of the same objectionable features as tobacco, cotton, and similar crops, because of the clean cultivation required and consequent drain upon the fertility of the topsoil.

Out of the corn crop, and the forage and pasture development which it engendered, came the greatest of all our

agricultural industries, the livestock industry. Today more than one-half of our more than 130 million people are actually concerned with the business of producing some kind of farm animals and poultry, growing the feed for them, and in the processing or preparing of products and delivery to the consumer.

The thrifty colonists who practiced diversified farming found that they could readily dispose of surplus food products to the one-crop farmer who neglected to provide for his own needs. They soon found also that the selling of surplus fresh and cured meat for export was profitable and later, during the latter part of the seventeenth century, developed a sizable enterprise. A quotation appearing in 1682 said, "Fresh porke with head, feet and leafe or without, 12 shillings per 100 pounds; fresh beefe, 10 shillings." This marked the beginning of the meat trade in America, which had grown out of the misery of tobacco, the one cash crop produced to any considerable extent up to that time.

At the beginning of the eighteenth century, many farmers had begun to reap the reward which their foresight, hard work, and the diversified farm program had brought them. It was during this period that brick made its appearance, the old frame structures being replaced with what are now known as "Early Colonial Mansions," built along the lines of their English ancestors. Industries began to develop along the Eastern Seaboard. Shipbuilding, the iron industry, and many other enterprises which supported a prosperous agriculture came into being.

During the early part of the eighteenth century cotton growing was beginning to be an important industry, the crop being used almost entirely for home use. Although important in the beginning, it was similar to tobacco in that it soon fell into the same errors and suffered reverses. About the middle of the century the export of cotton began, shipments being made to England. The extensive and profitable livestock industry, which had been built up and developed throughout the southeast, began to give way to cotton production.

It became apparent that one-crop farmers, with but few exceptions, had been taking from the soil such bountiful crops that for natural and well-founded reasons the old farm was not so kindly in cultivation nor so responsive to their efforts as it once was. They had been drawing upon their bank account so to speak, in the shape of soil fertility; and having made but few if any deposits, their bank account had run low and in many instances had become overdrawn.

Balanced with Livestock

Farmers who balanced their farm program with livestock saw the warning many years ago; harder soil, less resistance to excessive moisture or dry weather alike at certain seasons, and ultimately decreased yields that tell the final story of less humus and less available fertility. To save what is left, and restore most economically much of that which had been removed over the years of continuous cropping, the cash crop farmer found that he must resort to some kind of livestock sooner or later, not alone for the betterment of his farm, but for the welfare of his family and the nation as a whole.

This practice was significant then; it is even more so now. We know that while the livestock farmer wears out his farm only about one-tenth as fast as the farmer who sells the crops produced, he may actually improve the fertility and productivity of his farm, if the proper methods of returning the lost fertility are followed. To do so will require periodic applications of lime, phosphates, and potash in addition to maintaining the humus content and physical condition of his soil through proper cultural methods, return of stable manure, and turning under certain crops in the rotation of feed crops grown for his animals.

What has seemed strange to many farmers throughout the country is that

with all of the remedies which have been tried for helping agriculture, no widespread attempt has been made to have diversification show what it can do to help the farmer help himself.

Livestock is the balance wheel of diversified farming, and therein lies the hope of the farmer for a larger share of the national income. Successful stockmen know that pastures, forage, and grain crops are requisites for a profitable livestock enterprise, but until they are used effectively by some kind of farm animals and poultry for the production of food and conserving the fertility of the land in a long-time program, diversification in its true sense has not been put into operation.

How about that one-third or more of farms reporting year after year that neither cows nor hogs are kept? Many have no work stock or poultry of any kind, nor do they have a garden. When practical means are established for providing these assets, along with effective distribution and use of the products which they produce, then diversification will begin in earnest to show what it can do.

When mention is made of livestock in the diversification of agriculture, it is not merely so much beef or hard money, for example, that is meant. The use of farm animals and poultry almost invariably insures a more successful farm program in every way. When a load of fat cattle goes to market, there are wrapped up under their hides great quantities of pasture, corn or sorghum stalks, tons of coarse hays, and other products of the farm or mills that are otherwise of but little use to man. There are also tucked away beneath their hairy coats the hard work in sunshine and rain, the blistering heat and wintry breezes of a year or two. More than that, the bulging hides may hold the only hope of the year's taxes, interest on the farm mortgage, and the necessities as well as some of the nice things for the home and family. More important than all, they may represent the difference between happiness and misery for farm families in nearly every county in this country and millions of city homes everywhere. For their sake now and in future generations, farming diversified with livestock merits a chance to show what it can and will do to help the farmer help himself.

Grass and legumes for grazing have always furnished the basis for economical and efficient livestock production. Together grass and livestock make possible the beginning of diversified farming. A swing back to grass means that the farmer has a better chance to help himself.

Trees and the Soil

(*From page* 14)

and barley are preferred by some in the sections of mild climate where those crops will survive. A recent development is the use of the disk instead of the plow to turn the cover crop down in the spring. This leaves the growth on top to prevent summer erosion and does not injure tree roots. In orchards long cultivated, often the top-soil is too impoverished to grow cover crops satisfactorily. Commercial fertilizers come in here. Their addition makes the cover crop, and when that is turned down, all of the elements are still there for re-use by the trees.

This matter of fertilizers is more and more important. Mathematical principles have never yet been disproved, and when one subtracts year after year the original quantity grows smaller. Hence, although saving the organic matter by cover crops and erosion prevention is important, still many orchards will not produce to the maximum without additional aid in the way of purchased plant food. The particular fer-

tilizer to use will depend upon the original character of the soil and the use to which it was put before the orchard was planted.

This then all sums up to separation of the soil into two parts—organic matter and minerals. Without organic matter there will shortly be nothing to grow the trees in, without plenty of minerals there will be few boxes of fruit.

Not Tuff Enuff

(*From page* 5)

about folks who used to be our friends, and who never suspected we were tough; and by practicing that for a year we will generate enough local hate to give us plenty of crust and rind for any kind of lawless adventures.

Thus, if I assume an air of being mistreated and misunderstood on top of an acquired ego of gigantic proportions, I shall have ventured into the wonderful realm of modern world destinies and become strong enough to march in the vanguard, where I can slug the weak and strangle the unfortunate. In other words, when I lick my youngster I must lay off the old ideology that it hurts me worse than him, and replace it with might makes right. Because I must try to be a regular tyrant in my home circle, or I'm not apt to fit into the broader picture.

But the physical part of this new game of bluff and bluster is not going to be half as hard for many of us as the necessity we face of having to be mean in our material and business relationships. If what they predict is really going to happen to us Americans, and our war will be an economic one with no holds barred, I see my finish.

I'm too ignorant and timid to cheat, defraud, misrepresent, and compete ruthlessly. I don't know the economic game well enough to bust the rules cleverly, and my stock of *sang-froid* and *laissez faire* is nil. I wouldn't be smart enough to cover my tracks in an investigation, and the first hint of suspicion would blast my confidence.

Yet much as reformers have ranted at our commercial debauchery, I honestly think the major part of our citizens have been content with honesty to a degree that poorly prepares them for a business blitzkrieg. We may have a few colonels and quartermasters who can show us how to get tough that way, but I'd rather take a licking than enlist.

But when you simmer it all down, the real job I am up against is not so much being ornery with others as being adamant in dealing with my own whims, my own inclination to take things easy, and my own bullheadedness. This simply means, bad cess to it, that the time has arrived when I've got to be tough with myself. Self-discipline is the worst stumbling block in the road to reform.

CONGRESS should have set up some kind of a "self-denial" draft system and put a lot of us older birds into the menagerie. To me it is perfectly obvious that unless I have a hard-boiled sergeant to yank me out of bed and make me forego some of the lazy habits of life, I am not going to terminate my lethargy.

I have too many broken New Year resolutions in my personal history, and if there is anybody I wouldn't trust to castigate myself into an iron man, it's yours truly.

I can't afford to hire some tough thumper to prod me and harden me up, but maybe they could assign a WPA worker to ride herd on a bunch of us locoed softies, in a sort of job-lot contract. These Federal favorites would then find something else to do with their shovels besides leaning on them.

What gives me the jim-jams, however, is not merely how I am to get tough and grizzly toward my own small world, but what the effect will be here-

abouts when all the rest of you start in on the same brand new Yankee notion.

Americans, you know, when they once get a campaign well started and sloganized to perfection, are the best chaps in the universe to see it through with a vim. With all the publicity that is sure to come when we revitalize our community chests to take care of courses in thuggery and skullduggery at the Y. M. C. A. and the Salvation Army, and they announce prizes over the radio for the quickest transformations á la Jekyll and Hyde, what a stampede there will be. You won't hear much more about G. Washington and A. Lincoln, but our leaders will pattern their efforts at patriotism on Aaron Burr, Benedict Arnold, and the James boys.

Indeed I am sure that if America once takes firm hold of a policy like that, especially with any challenge in it, we can outdo any other continental hell-divers alive. We've got more resources to be mean with, and almost as many debts to repudiate as any outfit on the globe. So I am betting on us Yankees to become the scourge of the earth. It simply means that those geezers who started all this runkus to get tough will be the sorriest bunch of second-raters you ever saw in a bone-yard when it's all over. By gracious, I can almost grit my teeth and begin sizzling myself, so confident am I in our dirty destiny. Yip-ee, ride 'em down!

Fifth columns? Why we'll have ten columns, and maybe 13 just to make it decidedly unlucky. Sakes alive, if this can get a guy like me steamed up, what's going to happen to Jack Dempsey, Joe Louis, and John L. Lewis? It bodes no good for exponents of sweetness and light anyhow. The sun must have set on sentiment.

But seriously, what is your reaction when they sing that current popular number, "What are you doing for Uncle Sam, when he's done so much for you?" It's intended as a way to convert you to a little less selfish thinking and a trifle more rock-ribbed nationalism. But I can pick a flaw in it just the same, if you tolerate such ideas.

We love the things most in this world that we strive the hardest to get and sacrifice the greatest to enjoy. I dunno as I have striven very hard or sacrificed very much yet for my envied position as a citizen of the good old U. S. A. Yesterday a street workman with a rich Italian voice paused in shoveling gravel at my doorway and hummed "America." Then he shouted to his straw-boss with a cheery grin, "Ya, Meester, I am Americano now. I take examination before big judge yesterday, and he give me papers all right. I just as good Americano as you, I bet." No doubt he is just as pleased to wrap himself in liberty as my great grandfather was to give George Third the go-by. Yet he had it over me, because he had actually lived under adverse government dicta and unfair situations for the common man, while I had never had to dodge dictators or take harsh orders from any peacock. I just grew up in a land of relative liberty and took my share of it—and often a trifle more—without thinking how somebody earned it the hard way.

SO I think we will achieve a certain toughness of fiber by being willing and able to sacrifice here and there and perform a public duty here and there, in the name of queer old spangled pants Sammy. Then it strikes me that most of us after that experience will rare right up pronto and spit like a cross-eyed tom-cat, if anybody dares to threaten that old codger with physical violence. Then I would alter that ditty aforesaid to read—"Don't dare do anything to Uncle Sam, for I've done a lot for him." Why, we feel like that for our kids, don't we? Then why not for our country?

And finally, resuming the tough stuff, we have plenty of chances to get that way against the blighters whose nasty plots and policies destroy us from within; and if anybody really hankers for war, that's where I'd declare it.

No News Here

A man called on the news editor of a local paper and announced that his uncle had been taking the paper for 55 years.

"That's fine," said the news editor. "I hope he'll continue to do so."

"Oh, yes, he will. I want to tell you about him. He has always been a model of propriety. He has never been mixed up with women. He indulges in no vices and no excesses. And tomorrow he will celebrate his eightieth birthday."

"How?" asked the news editor.

Fan (Arriving late)—"What's the score?"

Friend—"Nothing to nothing."

Fan—"Good game?"

Friend—"Don't know. It hasn't started yet."

The meanest man in the world was the ventriloquist who threw his voice under the old maid's bed.

All Things Considered

Tourist (down South): "I see you raise hogs almost exclusively down here. Do they pay better than corn and potatoes?"

Native: "Wal, they don't suh, but hogs don't need no hoein'."

Definition of a baby: An alimentary canal with a loud voice at one end and no responsibility at the other.

"And how is your good wife, Sultan?"

"Oh, she's all right, but the other forty-nine are more fun."

"Dearest, your stockings are wrinkled."

"You brute! I haven't any on."

Rank Beginner

Mrs. Rastus Johnson—"But isn't yo' son too young to jine de ahmy?"

Mrs. Mose Jackson—"Well, he is tolable young yit but he's gwine into de infantry first, you know."

When a man wants his handkerchief, he reaches round and yanks it out of his pocket. When a lady wants hers, she rises, shakes herself, and picks it off the floor.

The friend of the family on his previous visit had had "one over the eight," and the daughter of the house was taking him to task for his lapse.

The friend took the reproof meekly until the young woman showed a tendency to rub it in, when he interrupted her with:—

"Hoots, lassie, ye ken naehting aboot it. Jist wait till ye hae tae pit your man to bed on a Saturday nicht!"

"I'll never marry a man who drinks!" declared the girl.

"Ah!" rejoined the friend, "but ye never can tell hoo' marriage'll affect a man."

FERTILIZER *Films* AVAILABLE

WE ARE NOW PREPARED TO LOAN without charge to agricultural colleges and experiment stations, county agricultural agents, vocational teachers, responsible farm organizations and members of the fertilizer trade, several films bearing on the proper use of fertilizers, particularly potash. *Distribution is being made from our respective branch offices as noted in the listing below, and anyone interested in showing these films should direct their requests to these offices.*

Potash in Southern Agriculture

Covers fertilization and potash deficiency symptoms of cotton, tobacco, and corn in the various States of the South. Depicts experimental work now in progress at several Experiment Stations, also crops in the field, fertilizer placement work, and scenes in a fertilizer factory.

16 mm.—sound, color—running time 20 min.

Projectors will be loaned where necessary.

Write to—American Potash Institute, Inc., Mortgage Guarantee Building, Atlanta, Georgia.

Potash From Soil to Plant

Covers testing soils to determine fertilizer needs, sampling of soils, potash deficiencies on prunes and grapes, also effects of fertilization on Ladino clover.

16 mm.—silent, color—running time 40 min. (on 1600 ft. reel).

Write to—American Potash Institute, Inc., Beans Building, San Jose, California.

Bringing Citrus Quality to Market

Shows influence of fertilizers, particularly potash, on yield and quality of citrus fruit. Quality factors include thickness of rind, volume of juice, weight and general appearance of fruit.

16 mm.—silent, color—running time 25 min. (on 800 ft. reel).

Write to—American Potash Institute, Inc., Beans Building, San Jose, California.

Machine Placement of Fertilizer

Covers methods of applying fertilizer to California orchards, lettuce, and sugar beets. Shows scenes of various types of apparatus devised by growers for applying fertilizer in orchards and on row crops.

16 mm.—silent, color—running time 15 min. (on 400 ft. reel).

Write to—American Potash Institute, Inc., Beans Building, San Jose, California.

New Soils From Old

This film was prepared for the Department of Agronomy, University of Illinois. Deals with the experimental work on Illinois Soil Experiment Fields and stresses the benefits from a balanced soil fertility program using limestone, phosphates, and potash in growing corn, wheat, clover, and other crops.

16 mm.—silent, color—running time 40 min. (on both 400 and 1600 ft. reels).

Write to—American Potash Institute, Inc., Life Building, Lafayette, Indiana. Please indicate size of reels desired.

Fertilizers Improve Midwest Crops

Shows effects of proper fertilization on the growth of corn, wheat, alfalfa, and other crops in Illinois, Indiana, and Iowa. Includes potash, phosphorus, and nitrogen starvation symptoms and their confirmation by chemical tissue tests.

16 mm.—silent, color—running time 40 min. (on both 400 and 1600 ft. reels).

Write to—American Potash Institute, Inc., Life Building, Lafayette, Indiana. Please indicate size of reels desired.

Requests for these films should include information as to group before which they are to be shown, date of exhibition, and period of time of loan.

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